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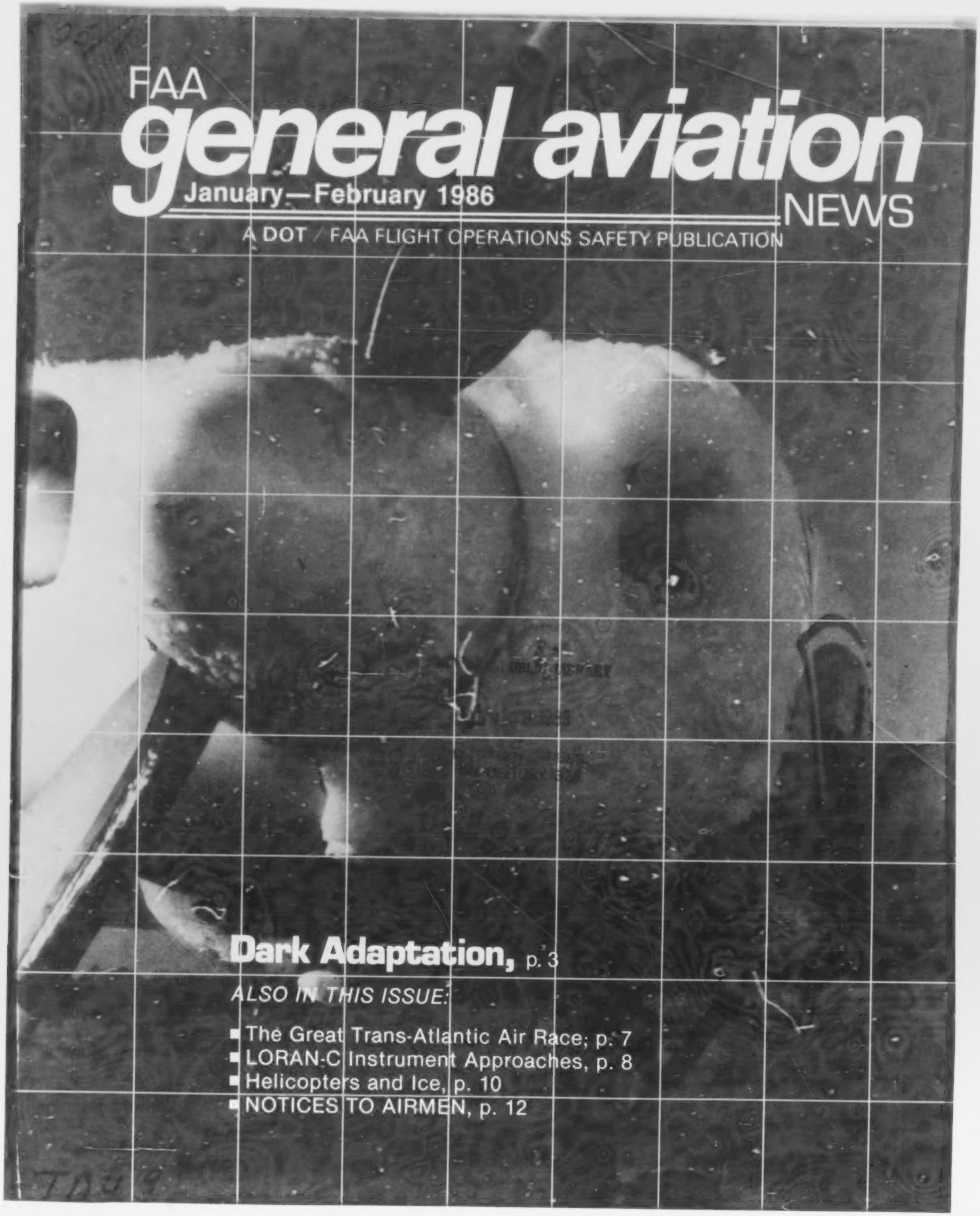

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# FAA GENERAL AVIATION NEWS

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Elizabeth Hanford Dole, *Secretary of Transportation*
Donald D. Engen, *Administrator, FAA*
Anthony J. Broderick, *Assoc. Admin., Aviation Standards*
John S. Kern, *Acting Director, Flight Standards*
Carol S. Rayburn, *Manager, General Aviation and Commercial Division*
David Gelfan, *Editor*
P.A. Duncan, Louise Oertly, *Associate Editors*

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## BRIEFS

AIR SECURITY. Pilots whose routes penetrate coastal Air Defense Identification Zones (ADIZ) will be interested in new Advisory Circular 99-1B, "Security Control of Air Traffic." Unless you are on a flight plan in an ADIZ, the North American Air Defense Command (NORAD)--who is responsible for monitoring air traffic in ADIZ's--will consider you either hostile or unfriendly and take measures to intercept. The AC is free from DOT Subsequent Distribution Unit, M-494.3, Washington, D.C., 20590.

STICKING EXHAUST VALVES. A rough running engine that quickly smooths out at high RPM could be indicating a serious problem--a sticking exhaust valve. A stuck valve could bend the pushrod and rupture its shroud, allowing oil leakage and eventually engine seizure. The hazard can be averted if you use the proper grade of fuel and adhere to regular maintenance schedules. A rough-running engine is a warning sign not to be ignored.

FAA FORECAST. Anyone interested in attending FAA's 11th Annual Aviation Forecast Conference on February 27, 1986 should make reservations now; rooms are limited. Contact the Mayflower Hotel in Washington, D.C. at (202) 347-3000.

WHAT'S A U.F.O.? Not necessarily what you may be thinking. It also stands for United Flying Octogenarians, an organization of pilots over 80 years of age who think young and hold current medical certificates. If you meet the above requirement, contact them at Box 123, Murrieta, CA 92362. They conduct safety meetings for younger pilots, too.

FROZEN BREATH. Oil breather tubes vent excess pressure that builds up in a crankcase during engine operation. However, when breather tubes are blocked by ice there is no place for that pressure to vent except by blowing crankshaft seals, and that can result in complete loss of oil. The breather tubes can be blocked by ice when condensation in the tubes freeze. Several incidents have been reported during winter months. Piper, Rockwell, and Cessna have service letters on the subject, and for most aircraft there is a modification or kit to vent excess pressure. Check with your dealer or manufacturer.

# DARK ADAPTATION

## *Short days and obscured terrain can alter the landing picture*

In the winter season the number of accidents or incidents involving landings at small airports at dusk or later invariably increases. By midwinter it starts to get dark around four o'clock over much of the country, and the shortened day means that many flights which would have terminated in broad daylight in the summery half of the year cannot be concluded before nightfall.

For some pilots this is not a big problem, but for others who may not realize how dependent they are on good, clear visual reference for carrying out skillful approaches and safe landings, there are unexpected hazards. Good preparation for long winter flights includes acquiring complete information about the destination airport, such as hours of attendance, lighting arrangements, NAVAIDs in service, etc.

Flight planning even for VFR should include an alternate destination in case the en route flight time is extended for any reason and no field lights will be available; up-to-date charts and *Airport Facility Directory*; a flashlight for reading same in semi-darkness; and eyeglasses if necessary.

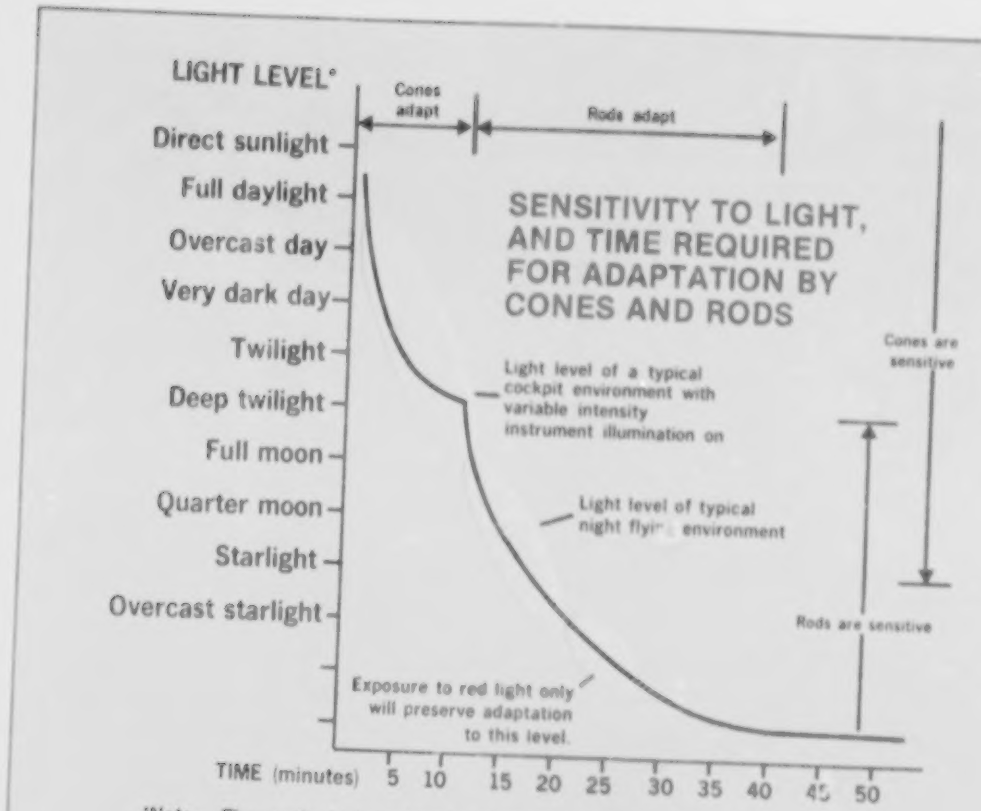
Such preparations are advisable even if you are returning to your home field, which you may feel that you know like the back of your hand. You may know it that well by daylight, but if you have never approached it after dark, with a camouflage of snow or clouds or shadows around it, and have to make a go-around or missed approach, you do not want to find out through experience where the trees or the hills or the woods are. A VFR day has a way of changing quickly to local IFR at dusk. When a pleasantly warm winter sun sets, the rapidly cooling air may bring patches of wispy clouds or fog over the runway in short order.

Snow on the runway may enhance the light levels at dusk, but it also has a way of changing your perspectives and depth perception. As with landing on glassy lakes, premature flaring is a distinct possibility.

Just how much a little darkness can affect an approach was illustrated by an accident that took place at Fulton County Airport near Atlanta, GA, recently. The pilot, with his wife and son aboard the Beech *Musketeer*, had departed Chattanooga, TN at approximately 11:30 p.m. for a return flight to their home base at Fulton County, according to the report filed by the National Transportation Safety Board.

When they arrived in the Atlanta area shortly after midnight, the tower at Fulton County was closed, but the aircraft was vectored to the airport by means of DF steers from the flight service station. Although fully qualified and current in the aircraft for night operations with passengers, the pilot had difficulty orienting himself toward the one lighted runway (8R/26L). The night sky was clear but dark.

While making a straight-in approach to 8R the aircraft was allowed to drift well to the right of the runway before the pilot recognized his predicament. He then raised the flaps and added full power for a go-around, but was unable to avoid ground contact. Damage was substantial, injuries to the pilot and his wife



*Note: The scale is logarithmic, absolute values would expand the scale tenfold towards the top. The light level descriptions are only approximations.

minor. The airplane came to rest just short of intersecting runway 14/32, after descending close to several hangars on the field. The pilot stated that he had become disoriented by strobe lights while attempting to line up with the runway.

One common fallacy that leads to night mishaps or tragedies is the assumption that automobile lights are an adequate substitute for field lighting. You line cars up at opposite ends of a runway, turn on their headlights, and you can set your little airplane down slick as a whistle. *Maybe.* If there is a complete absence of flight obstacles in the area, if the runway is completely free of irregularities, abandoned snow shovels, etc., and if it is long enough to tolerate your landing well past the threshold, etc., etc. Car lights are fine for a genuine emergency, but they are not designed to illuminate a runway; and they may be totally inadequate in some circumstances—as the pilot of a Beech *Bonanza* discovered unhappily on a dark night in Frisco, NC.

The *Bonanza* was headed for Billy Mitchell Field on Cape Hatteras, NC about 120 nautical miles from the departure point, Norfolk, VA. However, according to the investigation of the National Transportation Safety Board, the pilot was unable to get started until late in the afternoon. He knew that the airport lighting on the single runway (06/24) shut down 30 minutes after sunset, so he arranged with a friend on Hatteras to park a car at the approach end of runway 06 and to turn the lights on at approximately 8:30 p.m. The driver of this car later told the Safety Board that after the aircraft arrived in the vicinity the pilot attempted half a dozen approaches but broke off and executed a go-around in each case. He noted that a strong, southwest wind was "rocking the plane quite a bit," and that the airplane did not line up very well with the runway. On the seventh go-around the *Bonanza* drifted to the right, struck a power line (noted in the *Airport Facility Directory*), then crashed and burned.

Even when normal field lighting is present some pilots have trouble with night landings. The process by means of which the human eye adjusts to low light levels is known as "dark adaptation." The time required for dark adaptation varies considerably from individual to individual. Some persons can see "like a cat" at night, and some feel they are almost nightblind because of a slow adaptation rate.

Maximum adjustment to darkness takes at least half an hour under the best circumstances. At dusk a pilot may have little difficulty seeing outside the airplane at altitude en route, where light from the setting sun is still fairly good. But he may experience all kinds of trouble with his visual references once he descends in order to land—especially if he makes a fairly steep descent and a straight-in approach. Seeing in the dark also involves a number of physiological changes that may be of interest to airmen.

In several ways, the human eye resembles man-made devices for capturing images, such as a camera. It contains a lens to focus the images of objects at different distances, and an iris (i.e., "aperture stop") to regulate the amount of light reaching the sensors.

Like a color TV camera, the eye has three kinds of sensors, each sensitive to light of different wavelengths; these are commonly called the red, green, and blue cones. Unlike the TV camera, however, the eye also contains a fourth set of sensors, the rods. These allow the eye to see in dim light conditions. Distribution of the rods and cones differ. The fovea, where the image is focused, is a small area taking in only the central 10° of the visual field, and it is here that the cones are concentrated. Rods are sited outside the fovea, and the number per unit area of both types of receptor falls off as distance from the fovea increases.

In bright conditions, such as broad daylight or moonlight on snow, seeing is accomplished primarily or wholly with the cones. In these conditions, the pupil of the eye will be constricted, thus giving a reasonable depth of field. A normal observer will perceive a full range of colors, and will be able to detect small movements, even at the periphery. Vision at the center of the visual field is at its most acute, thus allowing us to read the small print, and see distant objects.

As darkness falls, several changes take place. These can be summarized by saying that sharpness is sacrificed for the sake of sensitivity.

In bright light, the rods are "bleached" of their sensitivity and take no part in creating images. After about 12 minutes in dim light—i.e., average moonlight or less—they have recovered enough to be more sensitive than the cones. They do not reach their maximum sensitivity, however, until more than 30 minutes have elapsed. At this point, they can detect light at 1/5000th the level at which the cones cease to function. In these light conditions, vision is monochromatic, and the ability to distinguish small or distant objects has fallen off drastically. The ability to detect flickering falls off and, because the pupil dilates to let in as much light as possible, the depth of field is reduced.

The cones adjust quickly but not the rods; moving from darkness to light and back to dark will require a period of re-adaptation. Most readers will have experienced this phenomenon while moving around an unlighted room in the middle of the night; it is possible to navigate around the furniture with some ease, but if the light is switched on momentarily, and then off, the darkness seems much "darker." That is why a too well-lighted cockpit can hamper your forward vision.

It is a peculiarity of the rods that they are not bleached out when exposed to light consisting entirely of red wavelengths. From a practical point of view, therefore, a large amount of dark adaptation can be preserved by remaining exposed only to red lighting. For many years, aircraft cockpits and flight offices were lit primarily with red lights (alternatively, those about to go flying wore red goggles). Some aircraft still use red interior lighting, and there is no harm in this as far as preserving dark adaptation is concerned. Most vision during night flying is from a mixture of cones and rods—rod vision alone would be too coarse for detailed flight information to be perceived. From this, it can be seen that it is not necessary to use red light to a degree that protects a total dark adaptation—or it is over-insurance.

On the other hand, the night flyer must take precautions to preserve as much dark adaptation as possible in order to see terrain features at night. Aircraft instrument and interior lighting should not be turned up higher than necessary. Pilots should avoid looking directly at bright lights, particularly at close distances.

Bright lights in the corner of the eye are more damaging to dark adaptation than those viewed head on. This is because the pupil constricts less to bright lights reaching the eye at the periphery than from light entering the central visual field.

There are other factors which can affect how well you can see in the dark. Of all parts of the human body, the retina has the highest demand for oxygen in the blood and is the quickest to suffer from any reduction in the oxygen level. Thus a person's general state of health will govern night vision capability, and cigarette smoking will have an immediate and detrimental effect. Conversely, breathing pure oxygen (above 4,000') will improve night vision.

### Judgement of Distance

Judgement of distance at night is more difficult than by day. During daylight the pilot estimates distance by comparing the sizes of nearby and distant objects. At night this is rarely possible when the only objects visible are "points" of light. Only the brightness of the lights can be used as a cue to judging distance. This is why, on very clear nights, lights will often seem closer than they really are, and on nights when the atmospheric visibility is low they will seem further away.

Judgement of distance will also depend on what you think the light is. For example, if you believe the light to be a flashlight, then you would not expect to be able to see it at more than a few hundred yards, if that. If, on the other hand, you identify it as a very powerful spotlight, then you would expect it be much further away. Therefore, *if you misidentify the light source you may make a completely erroneous estimate of distance.*

This phenomenon explains the stories of military pilots trying to fly formation at night with stars—thinking that they were formation lights of close-by aircraft. It is possible in similar fashion to confuse stars and ground or ship lights, a thoroughly disorienting experience. Remember that a single-point light source gives no altitude information, and two lights seemingly close together may be in completely different planes. Cross reference with maps and attitude flight instruments will help.

Finally, if the light level is low enough that only the rods are functioning, then judgement of size and distance will be seriously affected because of the rods' poor acuity.

*Conduct preflight while there is adequate light to reveal problems that night may hide.*

### Auto-Kinesis

Auto-kinesis, or self-movement, is another phenomenon of night vision that is useful to know about. It can occur when looking at a fixed light source against a dark sky with no surrounding lights or other visual cues—a star for example. After a while the light may appear to be moving or oscillating, and thus it could be mistaken for an aircraft light. To prevent this illusion, it is necessary only to avoid prolonged focusing on any one light.

### Night Viewing Techinique

Because of the distribution of the rods away from the center of the eye, it will be necessary to look a few degrees to one side or the other of an object in order to see it well when using rod, or dark, vision. Note also that the rods cannot perceive an object while the eye is in rapid motion, so it is also important to integrate short pauses in any scanning technique. (Rods can, as noted, detect moving *objects* well.)

"Night myopia" is a similar phenomenon to "empty visual field myopia." If there is nothing to look at, the lens of the eye relaxes to its least stretched position, focusing on a point one to two yards in front of the eye, or on internal reflections from the windows, particularly those associated with dirt, scratches, or rain. Making a strenuous effort to focus at infinity usually results instead in *shortening* the focal length. The only remedy is to actively search for and focus on light sources further than six yards away, however faint. The effect of night myhopia is worst in pilots wearing corrective lenses, particularly bifocals or trifocals.

### Preparing to Fly in the Dark

Apart from some basic requirements such as an aircraft equipped for night flying, the appropriate night experience being held by the pilot or instructor, and the weather being above night VFR minimums, one of the first practical steps to be taken by the prospective night flyer is to become more familiar with the aircraft systems, controls, and switches. The familiarity ideally should be such that the pilot can literally operate them blindfolded. This exercise is best carried out in daylight, in a parked aircraft, and with a fellow pilot assisting (not least to ensure that items such as starters or retractable gears are not actually operated).

All night flying is to some extent instrument flying; safety requires that for night VFR a pilot be trained in some basic instrument flying skills. Most pilots, of course, gain these skills as part of their pilot training, but they may need polishing.

### Night Vision

On the occasion of an actual night flight, dark adaptation of the pilot's eyes is one of the early considerations. In the office where last minute paperwork is being performed, subdued lighting will be of advantage; otherwise, make sure that you do not have to start taxiing until some time elapses after leaving bright lights.

*Subdued cockpit lighting is necessary for effective eye adaptation to nighttime conditions.*

### Flashlights

One of the key items that the night pilot must add to his tools of trade is a suitable flashlight. The type can be largely a matter of choice, but some guidance in choosing is in order. A "pencil" type can be easy to stow on the person and thus easy to keep track of. It will be helpful for reading charts, flight plans, memos, etc., in the subdued cockpit lighting. It is not the tool, of course, for inspecting the aircraft during the preflight, and it may not give enough light to show the airspeed indicator and altimeter readings in the event of an aircraft electrical failure. On the other hand, a very powerful flashlight is not necessary for either of these tasks, and it may degrade your night vision.

One final point on choosing a flashlight—beware of those with magnetic holders. The aircraft compass could be seriously affected.

### The Preflight Inspection

Take greater care with the walk-around at night, as items of general condition that would catch your attention by day will have to be more deliberately sought out. Plan the departure so that the preflight inspection does not have to be hurried. Select one to serve your needs.

All lighting, interior and exterior, should be checked for serviceability. Set cockpit warning lights to "dim." Navigation lights should be switched on at any time that the aircraft is parked on an active flight line with other aircraft moving about.

Make certain, while there is still daylight, that the windows are scrupulously clean. If you have ever driven a car at night with a dirty windshield you will appreciate the importance of this measure. If you are not the first to fly the aircraft that day, the buildup of film, bugs, dust and grime, etc., could be quite substantial.

### Startup

During the startup procedures, be certain to check the electrical system (battery condition and generator or alternator charging rate). At night you not only rely on your radios but also on lighting for such basic requirements as being able to see your airspeed indicator and altimeter. A sick electrical system could give you quite a problem if it expired while you were airborne—without a lighted runway in sight. Remember, too, that at night the system is probably having to cope with a much greater load than it would by day.

The field lighting facilities and times of use for your destination airport—and possible alternate en route—should be familiar to you. If you have to land without an operating VASI or other approach light system, try to get in some practice using only the basic rectangle of runway lights (preferably with an instructor on board). You want to be prepared for the absence of daytime clues for height above ground, such as trees, fences, people, dogs, etc.

### Inside the Cockpit

Contour shading on maps is more difficult to see, and red lines or text will disappear if you are using red lighting. Even under subdued white lighting, the less bold items will be more difficult to see, and this applies also to your flight plan log. Before flight, therefore, make sure that your notes are bold and legible, and that any particular features on your map have been highlighted with a dark pencil or pen.

Another problem that is caused by low light levels in the cockpit is that of housekeeping. If you drop your pencil, it can be much harder to find, and you will need to know where to reach for your computer and other navigation tools. A habit of always keeping them in, and returning them to, the same stowage is an advantage. The "pencil" light can be useful for locating mislaid items, but can itself be mislaid—what then?

### Outside the Cockpit

What you can see outside the cockpit will depend on three main factors: the degree of dark adaptation of your night vision, the cleanliness of the windows, and the level of light outside. The outside light level will be greatest on a moonlit night with good atmospheric visibility and a full moon. In these conditions, ground features may be almost as easily distinguishable as by daylight.

At the other extreme comes the night with a heavy overcast and no moon—"pitch dark" is the colloquial term. The only things you can expect to see on a night like this are man-made lights.

In between the two extremes there are an infinite number of light levels, but as far as navigation is concerned, you should be prepared for pitch dark. There are a couple of points to note about the use of moonlight, however. The first is that bodies of water will be surprisingly easy to distinguish from contiguous land masses, even when no other environmental details can be discerned. The second is that visibility will be better up-moon than down-moon—the reverse of ascending and descending sun visibility.

### Navigation Principles and Procedures

The key to successful night visual navigation is good planning. Know what visual features you are going to use as checkpoints, and highlight them clearly and prominently on your chart. Mark time intervals on your chart so that you know when to expect prominent and lighted landmarks.

At night your dependence on radio NAVAID's is predominant, and it is a good idea to have ADF as well as OMNI. It is critically important to identify NAVAID frequencies positively and to check the ident code. Many night accidents are due to an attempt to land at the wrong airport—even air carriers are sometimes involved.

### Prior to Landing

Protect your night vision as much as possible and be alert to any township light patterns that adopt a shape different to that expected, or which change their shape while you watch, or which disappear altogether. In such cases, suspect low clouds or fog. If weather obscuration does form, airmanship skill and knowledge of local conditions will dictate whether you should continue or divert to the nearest airfield that is open. If necessary, do not hesitate to declare an emergency and seek assistance from the nearest manned ATC facility.

Conquering the air and the darkness at the same time can be a very satisfying achievement—and a safe one, as long as you are realistic about the increased demands on your ability to plan, prepare, and execute. ■

*Editor's note: Part of the material for this article was taken, with permission, from Flight Safety, the civil aviation safety magazine of New Zealand.*

# THE GREAT TRANS-ATLANTIC AIR RACE

Harry Hawker

On April 1, 1913, the London *Daily Mail* offered a cash prize of £10,000 British to the first person to fly directly between North America and the British Isles within 72 consecutive hours. This was an incredibly rich purse, worth about $50,000 U.S. at the time.

Considering that the minimum overwater distance (from Newfoundland to Ireland) was nearly 2,000 miles and the contemporary distance record for airplanes was just over 400 miles, many readers believed the offer was some kind of April Fool's joke.

However, Lord Northcliffe, owner of the *Mail*, was in dead earnest. Ever since the insular security of Britain had been breached by Blériot's flight over the English Channel, Northcliffe had been warning the British public that the nation could no longer rely on sea power.

The outbreak of World War I in the following year proved Northcliffe to be a true prophet as aircraft, quickly developed into a military weapon, played a deadly role in combat. When at the war's end the Northcliffe prize was renewed, no less than seven British manufacturers quickly produced an airplane and assembled crews to enter the competition. Commerce as well as national security was the spur now, as the winner of what was being called the "The Great Trans-Atlantic Air Race" had a good chance of capturing a lion's share of the new market for transport aircraft.

Testing mishaps, financing, and other problems caused most of the contenders to drop out, but by March of 1919 the Sopwith and Martinsyde entries had arrived by ship in Newfoundland.

The preflight planning strategies of both camps had come to two conclusions: 1) to take advantage of prevailing winds, the flight should be from west to east; and 2) the shortest route would be from the easternmost point of Canada—St. John's, in Newfoundland—to the western coast of Ireland. So with crew and equipment ready, both groups arrived on the scene bursting with enthusiasm.

However, they were in for a rude awakening. They had not planned on Newfoundland's contrary weather (the landscape was a sea of mud from rain and melting snow) or its rugged terrain of rocky barren hills, marshes, and dense forests.

Finding a field suitable for a runway was almost an impossibility and, once found, required extensive work pulling up stumps and filling in ruts before it was usable. After that it was a matter of waiting for favorable weather reports from enroute ships and the Coast Guard, as there were no other reporting, or forecasting facilities available.

In the meantime the U.S. Navy had decided to pioneer the path across the Atlantic using four Curtiss flying boats (dubbed NC's), with a string of destroyers stationed every 50 miles along the mid-ocean segment to guide the aircraft.

The Navy had ordered four boats to use in anti-submarine patrol, but the war ended before they were delivered. The manufacturer, Glenn Curtiss, and Navy pilot Commander John Towers urged the Navy to sponsor a trans-Atlantic attempt and with the help of Assistant Secretary of the Navy, F.D. Roosevelt, approval was obtained.

The biplanes were the largest heavier-than-air planes ever built, with a wingspan of 168', a length of 68', and room for a six man crew. With four 400hp Liberty engines, they were capable of doing 93 mph, but as the fuel range was only 1,300 miles, the flight would have to be done in four stages. Taking off from Rockaway, NY, the planes would fly to Trepassey Bay, Newfoundland, and from there to the Azores 1,200 miles away. The final destination was Plymouth, England, via Lisbon, a total distance of 3,925 miles. The multi-stage route would disqualify them for the Northcliffe prize, but the honor of being the first to fly across the "Pond" could be theirs.

After losing one aircraft in a harbor accident, the three plane flotilla set out from Long Island on May 8, 1919. At Newfoundland the usual stormy weather prevailed and delayed the three flying boats, but finally, on May 16, all three-heavily laden with fuel for the long flight to the Azores—managed to stagger the water and head across the ocean.

Clear weather had been forecast all the way to Ponto Delgado, capital of the Azores. But after a night of flying in close formation they encountered fog and rain clouds and had to separate while climbing to 4,000' to get out of the clouds. They lost sight of the destroyer and after enduring hours of heavy turbulence became unsure of their position. With fuel running low, two of the "Nancies" attempted to land on the water, and were severely damaged by mountainous waves. The airplanes would never try again, but the crews were rescued by ships the area.

The last of the flying boats, NC-4, flew on alone, as ship after ship reported zero visibility and heavy mist. There was no let-up until the last ship before the Azores called in an observation of "visibility—ten miles." At this point NC-4 was at 3,400' over a mass of swirling clouds.

Then the clouds parted for a brief moment, long enough for the aircraft to make a quick descent and land heavily on a riptide of cross currents. They sustained some damage, were almost out of fuel and nearly 100 miles from Ponta Delgado. But they were in the Azores.

When on May 16 the two British teams saw the American flotilla take off from Trepassey Bay, they decided to wait no longer. No matter how unfavorable the weather conditions, they were not going to sit tight and give up the race without a struggle.

The first to take off, on the evening of May 18, was the Sopwith flown by chief test pilot Harry Hawker and navigator K. Mackenzie-Grieve. The son of an Australian blacksmith, Hawker was considered one of the most skilled pilots of his day. He was flying a small two-passenger biplane powered by a 350 hp Rolls Royce engine, with a cruising speed of 98 mph. Sopwith had built the plane for commercial aviation.

After an auspicious start in fair weather under bright stars, they encountered heavy rain squalls which twisted the airplane about like a leaf in the wind. Then they discovered that the radio was not working—they were cut off from the world. Worse was yet to come, as the water-

*(continued on back cover)*

# LORAN-C Instrument Approaches

*Long range navigation system will extend use of smaller airports*

The year 1986 may turn out to be a landmark in the history of general aviation if the limited use of special LORAN-C instrument approaches proves as acceptable to the national airspace system as FAA believes it to be. During calendar year 1986 FAA will authorize qualified operators to carry out specified non-precision approaches at designated airport runways, using signals emanating from distant LORAN transmitters. The agency intends to determine the type and make of LORAN-C receivers and the kind of procedures that will fit into the national airspace system before approving LORAN-C for general use as an instrument NAVAID.

The first such approach was completed in November of 1985, when a corporate Beech *King Air* 200 landed on runway 11 at Bedford, MA, with FAA Administrator Donald D. Engen at the controls. The Administrator expressed his satisfaction with the accuracy of the navigational guidance, which emanated from a triad of transmitters located at Nantucket Island, MA; Caribou, ME; and Seneca, NY.

LORAN-C was initially a long-range offshore navigation system, providing position, heading, and speed for ships hundreds of miles out at sea. (See the Sept./Oct. 1985 issue for details of how the system functions.) The low frequency (100 kHz) signal is known to travel at a predictable rate over the ocean, and with suitable corrections it can also be used over fresh water and land. Because it is low frequency it is not blocked by terrain obstacles (like VHF and UHF), but is able to follow the contour of the earth. The effective overland range can be as far as 1,000 miles.

Recent years have seen a modernization of the transmitters with solid state electronics and an enormous expansion of the information services provided by receivers—aided by computers and microprocessors—designed in large part for aviation use. Manufacturers are now producing low-cost equipment by means of which pilots will be able to navigate to any airport, land site, or fix in the nation with predictable accuracy—simply by punching in locator symbols, geographic coordinates or airport names and following a panel readout.

Starting in 1981, FAA began providing for the certification of LORAN-C equipment for area navigation in both IFR and VFR conditions. This year the agency is offering a limited authorization certificate for LORAN-C guided, non-precision IFR approaches conducted at the following airports: Bedford, MA; Burlington, VT; Columbus and Mansfield, OH; Orlando, FL; Portland and Salem, OR; and one more to be announced later. Without an authorizing certificate LORAN-C is not an approved instrument system for IFR approaches under Part 91.116.

In order to use LORAN-C for these approaches you must apply to a Flight Standards District Office in your region for a *Certificate of Authorization* or for a set of *Special Operations Specifications*, if you hold an air carrier certificate.

Applicants must be prepared to present evidence that their installed LORAN-C equipment meets appropriate airworthiness standards, as described in Advisory Circular 20-121. Flightcrew members must have completed a training program that assures (1) competency in the special LORAN-C approaches, (2) an understanding of LORAN-C navigation principals, (3) knowledge of the specific operating techniques and procedures for the approach(es) to be used, (4) familiarity with the LORAN-C cycle slip, and with the limitations of the equipment and the contents of the Certificate of Authorization, or Operations Specifications.

> *"In order to use LORAN-C for instrument approaches you must apply to a Flight Standards District Office in your region for a* Certificate of Authorization, *or for a set of* Special Operating Instructions, *if you hold an air carrier certificate."*

The Certificate of Authorization includes a requirement that (for any type of aircraft or operation) there must be two appropriately qualified instrument-rated pilots, with one pilot monitoring the underlying Standard Instrument Approach procedure signal (localizer. The need for an underlying procedure will be eliminated eventually, as competence and confidence in the use of LORAN-C is gained by airmen and agency facilities.

Before starting on the final segment of a special LORAN-C approach the pilot-in-command must inform the governing air traffic control facility that this procedure will be used. The correct triad (or chain of transmitters) must be selected and determined to be in use, and the current area calibrations value must be entered into the LORAN receiver. At a point no later than the final approach fix an accuracy check must be performed in accordance with the LORAN-C procedures of the aircraft's flight manual.

Use of LORAN-C equipment for IFR course guidance must be discontinued whenever the monitor indicates a LORAN failure or unreliable data; or the pilot observes a panel warning of degraded navigational performance; or if he is informed by an air traffic controller that the LORAN-C system is in alarm.

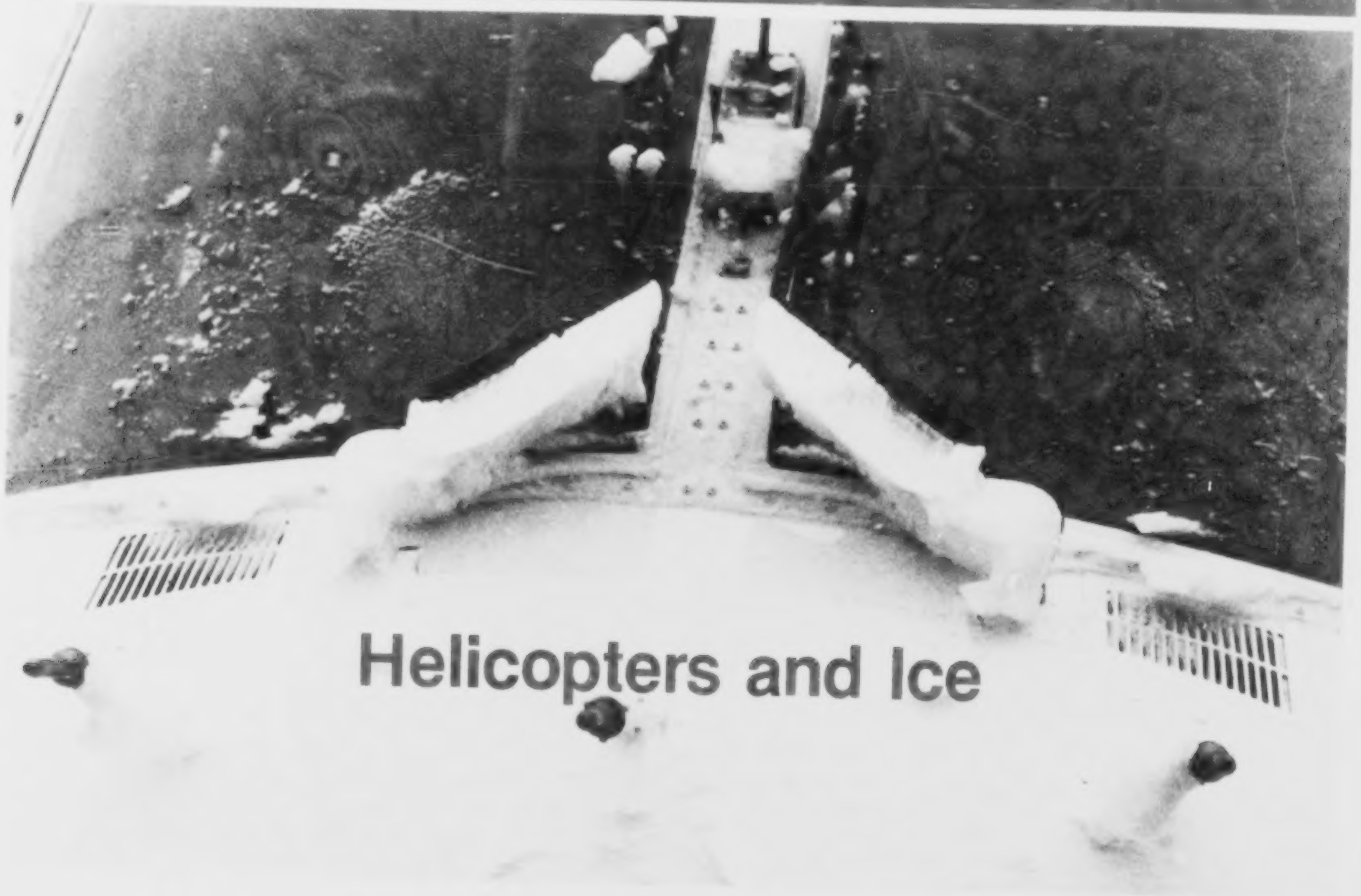
Similarly, during the current status of LORAN-C approaches, a missed approach procedure must be initiated any time the pilot who is monitoring the signal from the underlying Standard Instrument Approach procedure observes a deviation from course which would normally require abandoning that standard approach.

The details of the LORAN-C approach at each of the eight approved airport runways are provided by FAA when a Certificate of Authorization is granted. No graphic presentation or chart is included; this would have to be obtained by the operator from an independent source, such as Jeppesen. Only persons who have been issued an authorization by FAA for a special LORAN-C approach may use a LORAN-C approach chart.

The first set of procedures, issued for Hanscom Field at runway 11, Bedford, MA, is quite similar to the localizer approach for that runway, with an identical minimum descent altitude. However, air carrier operators are required to observe a landing minimum of 200 feet above the MDA and a visibility of ½ mile beyond the published minimum visibility during the first six months of operation.

These precautions are being taken because LORAN-C is a non-FAA (U.S. Coast Guard) system which is being incorporated into the national airspace. Some of the transmitters are being modernized and replaced, and there are a great variety of receivers coming on the market offering an enormous range of services and degrees of accuracy and redundancy. Some will track signals from two groups of transmitters simultaneously, for example, and some will not. Some will make error corrections automatically, others will not. From monitors installed in air traffic control towers at the eight LORAN-C approach sites, and from discussions with qualified pilot users, FAA expects to become familiar enough with the system to refine standards for equipment, and to establish procedures for instrument approaches at the thousands of airports where standard ground instrumentation is not affordable.

FAA hopes, in the near future, to see establishment of LORAN-C transmitters in the midsection of the country, so that aviation coverage will be complete and predictable. LORAN-C has already proved itself an inexpensive lifesaver for boaters and sea travelers, and it may turn out to be the wave of the future for general aviation. ■



# Helicopters and Ice

## *Why rotorcraft should avoid icing conditions*

Inflight icing takes an annual toll of all kinds of general aviation aircraft, since most of the fleet is not or cannot be adequately equipped with icing protection devices. This includes helicopters, which have some special vulnerabilities to icing in winter, when freezing levels in clouds are lower. These include:

- A great number (for many rotorcraft) of exposed parts.
- Lifting surfaces with a greater susceptibility to icing.
- Inability of pilots to observe ice developing on the rotor blades.
- A limited altitude range and airspeed capability (as compared with airplanes.)
- A smaller percentage of reserve power and airspeed (as compared with airplanes.)
- Greater vulnerability to ice shedding.
- Inherent technical difficulties that need to be overcome in order to provide reliable protection (for both anti-icing and de-icing).

**Exposed parts.** Although recently built helicopters are virtually enclosed in a metal skin, there are still many models in use in which the control linkages leading to the main rotor and to the tail rotor are completely uncovered. During cruise these control rods and cables undergo relatively little movement. In unfavorable conditions ice could interfere with their mobility and cause problems with blade pitch and other controls—although there is no direct evidence of any such accidents to date.

However, even on modern helicopters with full structural housing, some portions of the rotor mechanism are vulnerable to icing. For example, devices (called droop stops) designed to keep rotor blades from drooping low during shutdown and striking other parts of the helicopter or deplaning passengers, can be rendered inoperative during cruise in icing conditions. On landing this would allow continuous full flapping of the rotor, which could give the pilot control problems.

In general, because of lower airspeeds, the aerodynamic design of rotorcraft places less emphasis on streamlining and the absence of drag inducing fixtures, such as landing gear skids, handholds, door handles, external hinges, blunt forward surfaces, etc. This increases the potential for structural icing and performance degradation.

**Engine air inlet icing** is also a problem for helicopters in winter, especially turbine engines. Most rotorcraft have some sort of engine induction or inlet anti-icing system using engine bleed air. Helicopter pilots who operate regularly in cold weather make it a practice of turning on the engine anti-ice system any time there is visible moisture and a near freezing OAT. Some flight manuals call for engine inlet anti-icing whenever the air temperature is below +10°C. Follow the recommendations of your manufacturer. Incidentally, the use of bleed air degrades engine performance somewhat, and this should be borne in mind when contemplating constant use of engine anti-ice.

**Lifting surfaces.** At first glance it might appear that the relatively broad, stable surface of a typical airplane wing would be a likelier target for icing that the twisting, flapping, flexing rotor blades which make up the lifting surfaces of a helicopter. But this is not true. A small, narrow, elongated object like a rotor blade is actually much more effective as an ice catcher than the typical wing.

**"Invisible" ice.** The position and movement of the rotor blades make it virtually impossible for the flight crew to observe their ice buildup and the blades are usually the first to undergo an accumulation. Eventually the drag of the ice accumulation causes a drop in engine rpm, unless there is an increase in power input. With constant-speed rotor systems, this registers as an increase in manifold pressure for reciprocating engines, and an increase in torque for turbine engines. An ice buildup on the blades in the order of one-half inch can result in a torque fluctuation of five to six psi.

Therefore, careful attention must be paid to the gauges whenever there is a threat of in-flight icing. An increasing accumulation will soon mean that in the event of engine failure autorotation would not take place. Even with normal engine function, icing will lead to a point where there is insufficient power to hold altitude.

**Power reserves.** Ice buildups become critical more quickly in helicopters than airplanes, because rotorcraft operate commonly at 80 to 90 percent of available power, whereas a typical general aviation airplane cruises at 65 to 75 percent of available power.

This lower power margin also means that the helicopter is much more limited in its ability to climb in an effort to relieve an icing problem. If the rotorcraft is flying in a cold front, for example, there may be an inversion of warmer air several thousand feet higher, but the rotorcraft may have insufficient power to climb that high. Likewise the airspeed limitations of some helicopters mean that once in icing conditions it will take them longer than an airplane to change their environment horizontally.

**Ice shedding.** Rotor blade icing is subject to self-shedding—which quickly leads to rotor imbalance and structural vibrations if the shedding is assymmetrical as is usually true. Severe vibrations may cause structural damage and loss of control. The process may develop in a vicious circle, as vibrations induce more assymetrical shedding, resulting in worsening vibrations, etc. On the other hand, the ice shedding process can be self-correcting, if dislodged ice knocks ice loose from other blades, lessening the imbalance. The outcome of rotor blade ice-shedding is not predictable.

Secondly an ice-shedding rotor system becomes, in a sense, a gigantic sling shot flinging ice pellets in all directions. As much of the ice is thrown ahead, into the path of the helicopter, the entire rotor system (as well as the fuselage, to a lesser extent) is subject to a self-induced hailstorm. Since the tail rotor is also likely to ice up and become involved in the ice-flinging melee, there is a potential for serious, even disabling damage to the aircraft.

The one advantage the helicopter pilot has over airplanes, in dealing with ice, is the ability to land quickly and safely on almost any unencumbered, fairly level landsite. This is by far the best solution to problems called by inadvertent icing. As indicated earlier there are good reasons why attempting to climb to warmer air may not be possible, or waiting out the shedding process may not be practical. In resorting to an emergency landing, of course, the concerned pilot should bear in mind that persons on the ground could be injured by flying ice chunks. Set the aircraft down as far as possible from persons or buildings on the ground. Be prepared to follow the manufacturer's recommendations for landing with ice on the blades—especially with regard to hovering and flaring.

**What about ice protection systems?** Here again the design of the helicopter has created inherent difficulties. Providing sufficient energy for continuous anti-icing or de-icing along the entire length of the rotor blades would require a tremendous outlay of energy, more than that which is currently available from the power sources in common use. Keeping the large plexiglass bubble or pilots' windshield area clear of ice is also a problem.

Thus far only one make and model of rotorcraft has been certificated by FAA for flight into known icing conditions, and that is the French-built Aerospatiale *Super Puma*. The *Super Puma* was developed for rescue missions and flights into otherwise inaccessible areas in weather conditions that had previously grounded such missions. Nearly a decade was spent in perfecting and testing the icing protection system.

The *Super Puma* is a twin-turbine, medium-range helicopter capable of about 173 mph. The rotor blades are constructed of a new composite material. The icing protection system consists of an OAT thermometer, an ice detector, an automatic activation and monitoring assembly, an extra alternator to power the system, de-icing on the main rotor blades, anti-iced tail rotor blades, and de-icing for the horizontal stabilizer. The pilot's and co-pilot's windshields have an electrically heated mat imbedded between two layers of hardened glass to keep forward vision clear. This windshield has survived the impact of a one-inch ice ball thrown at a velocity of 250 mph.

Each main rotor blade has a de-icing mat extended along its leading edge and curving aft for several inches on the top and bottom surfaces. Imbedded in the mat are five electrical heating strips that are automatically activated by a monitor, which "predicts" icing conditions based on the outside air temperature range. A timer keeps the strips heated for as long as the monitor senses that the aircraft is within a temperature range pre-selected by the pilot. The heat loosens the ice, which is then self-shed. Electrical heat for anti-icing is provided to the tail rotor. The stabilizer is protected by use of a de-icing boot activated by engine bleed air.

Other models are in testing for complete icing protection systems, but as yet none have been certificated.

Helicopter icing accidents have not been numerous to date, owing in large part to the care which pilots have exercised to avoid known icing and to land at the first indication of inadvertent icing. Another contributing factor is the relatively small number of makes and models of helicopters certificated for IFR operations which could expose them to icing in unfavorable conditions.

However, this number is expected to increase rapidly, following recent changes in manufacturing trends which are resulting in greater numbers of helicopters certificated for IFR flight. Whether this results in more helicopter icing accidents or not depends upon pilot alertness to weather activity, as well as a clear understanding of the vulnerability of their aircraft. ■

*Aerospatiale* Super Puma, *only FAA-certificated helicopter for flight into icing conditions.Protection includes de-icing, anti-icing, engine shields.*

# NOTICES TO AIRMEN

## *Some vital flight information may not be included in a briefing*

*The pilot indicated the flight started out routinely—a five-hour cross country in a* Piper Cherokee *to visit some friends in Comfort, NC. He had made the trip several times, although not in the last six months, and was familiar with Comfort Airpark. Before he departed he obtained a standard briefing by telephone from an FSS and was told that VFR conditions were forecast along his route. The briefer did not mention any NOTAM's. The pilot then made sure his charts and* Airport/Facility Directory *were current and planned his flight.*

*Departure was normal, and once in the vicinity of Comfort, the pilot contacted Wilmington approach control for VFR advisories, which were provided.*

*The flight continued uneventfully until approach control radioed, "Comfort five miles, 2 o'clock. Report airport in sight." The pilot peered in the indicated direction and very shortly spotted the runway. He reported he had Comfort in sight, and radar service was terminated.*

*The pilot flew a standard VFR approach pattern and noticed no airplanes parked on the field. That he attributed to a busy VFR day. There was no response to his call on UNICOM, but that was not unusual at a small strip. He continued the approach. It was on short final that the pilot noticed some kind of faint marking on the runway. He was almost over the numbers when he realized it was a thinly painted "X;" the runway was closed. In momentary confusion the pilot felt the gear touch down and so decided to land anyway. On the roll-out, he swerved to miss some kind of debris on the runway, ran off the side, and nosed over in a drainage ditch. Although the aircraft was badly damaged, the pilot was unhurt.*

*On talking the next day with the FAA inspector, the pilot learned that the airport had been NOTAMed closed for the past three weeks while the operator took an extended vacation in Bermuda. The pilot indicated that no NOTAM's to that effect had been given him during his flight service briefing and that he thought NOTAM's were automatically included in a standard briefing. The inspector pointed out that the NOTAM had been published two weeks earlier. Tapes of the pilot's conversation with the briefer showed that he had not requested published NOTAM's from the briefer.* "I have to request published NOTAM's . . .?"

"Yes, you do."

Safe flight is dependent upon an equipped, airworthy aircraft and a qualified, *informed* pilot. A pilot has at his or her disposal various sources of needed information on weather, navigation, airports, and so on. Consider, however, the *timeliness* of the material in some of those sources: VFR Sectional and Terminal Area Charts are updated every six months; IFR charts, approach plates, and the *Airport/Facility Directory* are updated every 56 days. (See the National Oceanic Service's Chart Catalog for issuance periods of other aeronautical charts and publications.) The process of incorporating changes and assuring the accuracy of such changes to charts and other printed matter does not lend itself to short-cutting. So, where is a pilot to find the most current, up-to-date information about changes in the airspace or at an airport that could affect the safe outcome of a flight?

*Notices to Airmen* (NOTAM's) as described in the *Airman's Information Manual*, contain information (either of a temporary nature or not known sufficiently in advance to publicize by any other means) concerning the establishment, condition, or change in any facility, service, or procedure of or hazard in the National Airspace System. NOTAM's contain information that can affect a pilot's go/no-go decision, information such as airport or primary runway closure, changes in the status of NAVAID's, ILS's, radar service, etc.

To the FAA it is implied in FAR § 91.5 that the "all available information" a pilot is expected to have before a flight means all available *current* information, especially where NOTAM's are concerned. The possibility of violating regulations aside, not obtaining current information about your flight could be considered a liability in a court of law in the event of an accident.

There are three types of NOTAM's: NOTAM (L), NOTAM (D), and FDC NOTAM's. The "L" in NOTAM (L) stands for "local" and indicates these NOTAM's receive local distribution only. They report items involving taxiway closures, men and equipment near or crossing runways, airport rotating beacon outages, and airport lighting aids not affecting instrument approach criteria. Usually initiated by an airport manager or operator to a flight service station, this type of NOTAM is not attached to hourly weather reports. NOTAM's (L) are kept on file at the issuing flight service station for facilities in its area of responsibility only (about a 400-mile area). NOTAM (L) information from other areas must be requested by the pilot either from the FSS with jurisdiction or through a local FSS, which can contact the FSS with jurisdiction. These NOTAM's are given only local dissemination because they contain material which is believed does not affect a pilot's decision whether or not to use the airport, i.e., the condition does not render the airport possibly unusable. For example, cattle near the airport, mowing near the runway, etc. They remain in effect until the initiator cancels them, or they become permanent by publication.

NOTAM's (D), in addition to local dissemination, are also given "distant" dissemination over the entire FSS telecommunications network. They contain information on navigational facilities that are part of the National Airspace System, on all airports with approved instrument approach procedures, and for some VFR airports (noted in the *Airport/Facility Directory* with this symbol § ), in other words, items serious enough to affect whether or not the airport or some facility is usable. NOTAM's (D) can be initiated either by an airport manager, the air traffic service, or an FAA regional or field office to a local FSS. They are then stored in a central database and are included in the hourly weather reports provided to flight service stations. NOTAM's (D) remain valid until expiration (usually set by the initiator), publication, or cancellation by the initiator.

An FDC NOTAM is regulatory in nature and is initiated and transmitted by FAA's National Flight Data Center via teletype. In addition, FDC NOTAM's are published in a biweekly publication called *Notices to Airmen* (*Class II*). The NFDC is an office in FAA Headquarters in Washington, D.C. where safety information for a number of aeronautical publications is compiled and organized. NFDC obtains the NOTAM information from FAA regional offices and the air traffic service or an airport/facility operator. FDC NOTAM's remain in effect until canceled by NFDC. FDC NOTAM's are considered regulatory because they deal with airspace, airways, instrument approach procedures, and aeronautical charts.

*Temporary flight restrictions*—which have the weight of regulations—are also advertised by FDC NOTAM. (Temporary flight restrictions are put into effect over an area where some incident or event has generated a great deal of public interest and is, therefore, likely to create an air congestion hazard. Major sporting events, parades, natural disasters, etc., are typical. A fairly recent, well-known temporary flight restriction was that imposed over Mt. St. Helens during its active period.)

Until they are published in the biweekly Notices to Airmen publication, NOTAM's are automatically included in the *standard briefing* given by an FSS briefer for a pilot's flight plan area. This includes NOTAM's (D), NOTAM's (L), and FDC NOTAM's. However, once they have been published, they must be specifically requested by the pilot during a preflight briefing. That is why reviewing published NOTAM's or "Class II NOTAM's" should be part of your preflight planning. (In any of the other briefings offered by an FSS—*abbreviated*, *outlook*, or *inflight*—NOTAM's must be requested. Unpublished NOTAM's obtained from an FSS are called Class I; published NOTAM's are called Class II.)

NOTAM's in the Class II publication are of either a temporary nature (but expected to remain in effect for an extended period) or permanent changes published as an interim step before inclusion in an IAP, on appropriate charts, or in the *Airport/Facility Directory*. The information will be published every two weeks until it expires or is canceled. Temporary and permanent items are differentiated by the notations *FI/T* (flight information which is temporary) and *FI/P* (flight information which is permanent), respectively, in the publication.

The biweekly publication, entitled "Notices to Airmen - Class II NOTAM's," is published by FAA's National Flight Data Center and may be purchased on a subscription basis from the U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20591. The most recent price was $51.00 per year (26 issues) for domestic delivery, but check with GPO before ordering.

Information in this publication is not limited to a specific geographical area, like NOTAM's (L), or to specific airports, facilities, etc., like NOTAM's (D). It encompasses changing conditions in the airspace or on the ground. For all airports currently listed in the *Airport/Facility Directory*, the publication gives any abandonments, openings, or closings; and openings, closings, commissionings and permanent closings of runways.

For NOTAM (D) airports (all IFR airports and selected VFR airports) Class II NOTAM's provide information on 1) airport operating restrictions for air carriers and crash/fire/rescue facilities; 2) approach light systems; 3) control zones; 4) displaced thresholds; 5) runways; and 6) runway light systems.

Class II NOTAM's also provide information on NAVAID's, communications, and other services. For NAVAID's they indicate commissioning of new facilities, decommissioning of old, frequency changes, restrictions, and outages. Information on air traffic control towers and approach controls include commissionings and decommissionings and hours of operations. The same type of information is presented for flight service stations and remote communications outlets, as well as information on automated weather observing systems.

The publication itself is divided into two sections, the first containing, respectively, general NOTAM's, airway NOTAM's, flight restriction NOTAM's, and NOTAM's on airports, facilities, and procedures—all listed by state. Section II contains "Specials," which are often too lengthy for Section I or which may contain supporting graphics. Section II will have material depicting temporary MOA's or restricted areas or temporary procedures for a special event, such as a fly-in. The material in Section I is greatly abbreviated to save space, but a glossary of abbreviations is included in the booklet. Of course, those requested from an FSS will be "translated" by the briefer for you.

Other than directly from a briefer or the Class II publication, there is a method to obtain NOTAM's in flight. Some FSS's make unscheduled broadcasts over VOR's with voice capability (no underline on the frequency shown on charts). These "Aviation Broadcasts" may be issued when a special weather report is made, when urgent PIREP's should be disseminated, or when NOTAM's—(L) or (D)—are particularly important. For example, a runway might be NOTAMed closed for a short time to remove snow or ice. Unfortunately, these broadcasts are made randomly (they are *unscheduled*, remember) and would require the pilot to monitor the VOR frequency constantly—not easy when you have other frequencies to deal with.

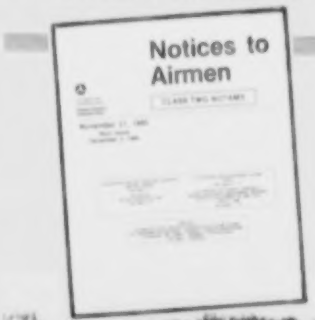
There is also what may be considered a fourth type of NOTAM, those involving foreign locations, and that includes Mexico and Canada. The NFDC keeps foreign NOTAM's on file, and they may be obtained from any FSS on request. *International NOTAM's* is another biweekly publication featuring NOTAM's for and about foreign locations. Their content and format are similar to that for the Class II publication. This subscription also comes from the Government Printing Office (address above), and the current price is $48.00 per year.

Practically speaking, what good are all these NOTAM's for everyday flying? As mentioned earlier, obtaining NOTAM information is implied by § 91.5 (". . . all available information . . ."). Knowing all you can about your place of intended landing or the route you are to take is also just plain good sense. Reading about a closed runway in the safety of your den is far preferable to noticing an "X" on a runway as you turn on short final. Further, even though you carry the most up-to-date charts, approach plates, and *Airport/Facility Directories*, changes can occur before the next editions. NOTAM's assure that you are the best informed pilot you can be.

For example, construction near an airport could involve a permanent change in the minimums for an instrument approach, or even cancellation of the approach altogether. If you have not obtained this information from NOTAM's before flight, you could be in violation of Federal Aviation Regulations. Worse yet, you could become an accident statistic.

NOTAM's are helpful to all pilots, VFR and IFR, even though the bulk of NOTAM's may seem geared to instrument flying. VFR pilots will want to know the status of runways and facilities at airports and NAVAID's they use. Indeed, the *Airman's Information Manual* suggests that VFR pilots practice IFR procedures whenever possible, especially obtaining NOTAM's from your preflight weather briefing.

"I didn't know" is never an acceptable excuse. ■


Notices to
Airmen

*Winter closings, common at some small airports, may be published as NOTAMs.*

# AvNEWS

## TRANSPONDERS MUST BE "ON" IN CONTROLLED AIRSPACE

Pilots of general aviation aircraft now must keep their transponders turned to the "on" position at all times while flying in any controlled airspace, whether they are communicating with air traffic control or not. Until this change to FAR § 91.24, activated transponders were required only in terminal control areas and above 12,500' MSL.

Keeping the transponder on while in controlled airspace—even if VFR—presents a positive radar signal to air traffic controllers, which enables them to track aircraft more accurately and helps reduce the mid-air collision potential.

The only exception to the new requirement would be a controller request to turn the transponder off or to "stand-by" or "low," because of radar clutter—an infrequent occurrence—in busy traffic areas.

## FOURTEEN ARSA's IN PLACE; 30 NEW SITES PROPOSED

Thirty more major airports have had airport radar service areas (ARSA's) proposed for their immediate airspace. As of the beginning of this year, ARSA's were in place at Albany, NY; Anchorage, AK; Austin, TX; Baltimore, MD; Bradley, CT; Columbus, OH; Corpus Christi, TX; MacArthur Islip, NY; Pensacola NAS, FL; Pensacola Regional, FL; San Antonio, TX; Syracuse, NY; Tulsa, OK; and Whiting NAS, FL. The configuration of several of these ARSA's were changed in response to public comment.

ARSA's are two-layered, circular airspace around a primary airport, where all traffic is known and monitored by air traffic control. Aircraft are vectored only as necessary for conflict avoidance and sequencing. Two-way radio communications are mandatory. Shown on sectional charts by blue hash marks, ARSA's are replacing the voluntary terminal radar service areas (TRSA's).

In addition to other locations already published in *FAA General Aviation News* (May/June 1985; Sep./Oct. 1985), the next 30 candidate airports are:

*ALABAMA:*
  Birmingham
*ARIZONA:*
  Davis-Monthan AFB
  Phoenix Sky Harbor Int'l
  Tucson Int'l
*ARKANSAS:*
  Adams Field, Little Rock
*CALIFORNIA:*
  Beale AFB
  Castle AFB
  McClellan AFB
  Mather AFB
  Metropolitan Oakland Int'l
  Sacramento Metro
*FLORIDA:*
  Tampa Airport
*GEORGIA:*
  Columbus Metro
*INDIANA:*
  Michiana Regional
  Indianapolis Int'l
*KANSAS:*
  Wichita Mid-Continent
*KENTUCKY:*
  Greater Cincinnati Int'l
  Standiford Field
*LOUISIANA:*
  Lafayette Regional
*NEW MEXICO:*
  Albuquerque Int'l
*NEW YORK:*
  Greater Buffalo Int'l
*NORTH CAROLINA:*
  Charlotte Douglas Int'l
  Raleigh-Durham
*TENNESSEE:*
  Memphis Int'l
  Nashville Metro
*TEXAS:*
  Dallas Love Field
*UTAH:*
Salt Lake City Int'l
*VERMONT:*
  Burlington Int'l
*VIRGINIA:*
  Washington Dulles Int'l
*WISCONSIN:*
  General Mitchell Field

For dates and locations of public hearings in the respective areas, contact your local FAA field office. Comments should be sent to FAA's Office of the Chief Counsel, 800 Independence Ave., S.W., Washington, D.C. 20591.

## FAA INAUGURATES "BACK-TO-BASICS"

A three-year campaign to reduce radically the toll of readily preventable accidents in general aviation has been launched by FAA on a national scale.

This "Back-to-Basics" campaign was activated by FAA Administrator Donald D. Engen, who noted that while the U.S. safety record is second to none and steadily improving, there has been a continuing pattern of pilot-error accidents that simply never should have happened.

These accidents have been associated with 12 basic components of flight operations, and an intensive effort will be made to heighten pilot awareness of how and why the accidents occur. Three months of each year will be dedicated to each subject. Pilot safety seminars in all of the states, sponsored by aviation industry groups and the FAA, will all deal with the same subject during this period. For example, the first quarter of 1986 will spotlight takeoff and landing procedures.

Unofficially, there were over 1,000 takeoff and landing accidents in 1985 alone. Accidents during these phases of flight have traditionally comprised the largest grouping year after year.

For a schedule of safety meetings in your area on 1986's topics, consult your Accident Prevention Specialist or Counselor or an FAA district office. Anyone interested in participating in Back-to-Basics by sponsoring a safety meeting should contact their local Accident Prevention Specialist for assistance.

## MORE AUTOMATED FSS'S

Eleven newly automated flight service station hubs are scheduled to be operating in 1986 at the following locations:

Terre Haute, IN (includes LaFayette, IN)
Green Bay, WI (includes Milwaukee, WI)
Columbia, MO (includes Kansas City, MO)
Conroe, TX (includes Houston, TX)
Macon, GA (includes Alma, GA)
Prescott, AZ (includes Phoenix, AZ)
Reno, NV (includes Las Vegas, NV)
DeRidder, LA (includes New Orleans, LA)
McAlester, OK (includes Oklahoma City, OK)
Ft. Dodge, IA (includes Des Moines, IA)
Hawthorne, CA (includes Los Angeles, CA)

Automated briefings via touch-tone telephone, similar to those described for the Leesburg, VA AFSS in the November/December 1985 issue of FAA GENERAL AVIATION NEWS, can be expected at each new station.

## LATEST AIPMAN PUBLICATIONS

### Inspection Authorizations

A list of certificated mechanics with inspection authorization is found in AC 65-13H, "FAA Inspection Authorization Directory." Purchase from Superintendent of Documents, Government Printing Office, Washington, D.C., 20402.

## • A Question of Compensation

*Is it considered an operation for compensation or hire if I, as a private pilot, take aerial photos from my experimental aircraft and sell them?*

*Name withheld*

A private pilot may act as pilot in command of an aircraft in connection with any business or employment if the flight is only incidental to that business or employment and persons or property are not carried for compensation or hire. Therefore, your taking photos, which you subsequently sell, from your experimental aircraft would appear to be permissable *unless* you were carrying someone else who was taking the pictures and selling them [FAR § 91.42(a)(2)].

If there are further considerations which require discussion, consult your local flight standards district office.

Just a reminder: Since you are using an experimental aircraft, you may not operate over densely populated areas or in congested airways.

## • When Words Co-lide

*I enjoy your magazine very much and in fact it is far better in accuracy and authoritativeness than at least one of the popular, commercial aviation magazines. Please do not take the criticism that follows out of context. It has to do with dropping letters out of words.*

*Most writers would never make the following errors in spelling: co-lide, co-lision, co-lect, co-lateral, co-lusion; and they probably would not even commit such mis-spellings as co-loquial or co-late. But when it comes to* collocate, *up pops the spurious hyphen, "poof" goes the disappearing "l;" born is the illegitimate "co-locate."*

*FAA sources used to be uniform—and nearly unique—in getting this popularity misspelled word right. But alas, now even the FAA GENERAL AVIATION NEWS has fallen on its face ("Instrument Approach Problems," July/August 1985).*

*I appeal to you as Editor: Can you not see that all your contributors learn to spell it?*

*Dr. Newton W. Miller*
*Redlands, CA*

Criticism accepted. Examine the article on automated flight service stations in the November/December 1985 issue.

By the way, "misspellings" as used in your second paragraph above, also is not supposed to have that "spurious hyphen."

## • A Familiar Ring

*Thanks for the September/October 1985 article, "The Enemy Within," about proper winter storage for aircraft. That title, however, seems familiar. I know I've heard it somewhere. Where did you borrow it from?*

*Sharon Marcey*
*Falls Church, VA*

It is a well-used literary phrase referring to treasonable actions, popularized in an episode of a famous science fiction television program currently in re-runs somewhere.

## • BFR and the Wings Program

*I have a question regarding FAR §61.57. It states, in part, that a person who has completed a pilot proficiency check within the preceding 24 months need not accomplish the biennial flight review (BFR). Would getting one of the Phase Wings under the Pilot Proficiency Program count as a BFR? If so, does the CFI need to so annotate the logbook?*

*Ralph Tanner*
*Kalamazoo, MI*

The flight time required—one hour of airwork, one hour of instrument flying, and one hour of take-offs and landings per phase—to obtain either of the Phase I-V wings in Accident Prevention's Pilot Proficiency Program could, upon the discretion of the flight instructor, be considered satisfactory for a biennial flight review. (Attendence at an FAA-sponsored safety meeting is also required to obtain a set of wings.) If the CFI determines that the qualifications of the BFR have been met, a specific BFR notation must be made in the airman's logbook.

## • Clean Communications

*Recently I was on a 250-mile cross-country flight for the instrument rating. The weather was absolutely VFR—not a cloud in the sky, and you could see forever.*

*The first stop was to be at Lancaster, PA for the ILS there. I had not filed IFR, so about 20 miles from Lancaster I tuned in the controlling facility (Harrisburg Approach Control).*

*The first thing I heard was the controller call up an airliner whose captain responded. After a brief, routine exchange the controller then asked what the airline's policy was on shipping pets, specifically two collie dogs that another controller wanted to take with him when he transferred to San Juan, PR. The pilot outlined the policy, the two discussed its pro's and con's, and the captain told the controller to get in touch with the airline's chief pilot on the field for further information. The controller thanked him and "moved on." This took up a good five minutes while I fumed.*

*Initially I thought I had tuned in UNICOM by mistake, but a check and double check showed I had the correct frequency. When I did get through, the controller responded right away, gave me a squawk, then let me fly through the localizer before he remembered me again. Shortly after I alerted him that I had gone through the localizer and was headed away from Lancaster, a different controller replaced him. Maybe it was the regular shift change; I don't know.*

*All I could think of was a lot of "What if's." What if I were trying to declare an emergency? What if it had been a heavy IFR day? and so on. Maybe it was because the weather was so good that he felt he could let up a little bit. Anyway, who should know about this?*

*Name Withheld*
*Woodbridge, VA*

It can be reported to the Harrisburg Tower Air Traffic Manager if you so desire. You would have to give the exact date and the approximate time of the occurrence. Tapes of controller/pilot conversations that are made routinely are not kept for more than 15 days, so it is best to act at once. If it happens again, make a full stop landing and a call to the tower manager.

If you wanted to report without giving your name, there is the Aviation Safety Reporting System, where such safety issues are investigated and approximate action taken. Any personal information which you place on the form, which is available from FAA field offices and most towers, is de-identified to preserve your anonymity.

There is also the FAA Safety Hotline, which will also keep your identity confidential. The toll-free number is 1-800-255-1111; for the Washington, D.C. local area dial 426-9365.

Such behavior is certainly the exception and not the rule. Controllers, like pilots, cannot afford to be lulled into complacency in good weather.

**FAA GENERAL AVIATION NEWS** welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.

## • Traffic Separation in CZ's

*I have heard pilot instructors make the statement that VFR and IFR traffic are separated by air traffic control in a control zone. I keep telling them this is nonsense—isn't it?*

*William Cowan*
*Lynn Haven, FL*

That could be a dangerous and misleading statement. In VFR weather the pilots of both VFR and IFR aircraft must scan continuously for other traffic. If the ceiling is less than 1,000′ or the visibility is less than three miles in a control zone, VFR aircraft are not allowed in the control zone without a special clearance from ATC. In a control zone IFR traffic is given separation from other IFR traffic and any SVFR traffic.

## • Free to Choose

*Your response to the "ARSA Questions" in the July/August 1985 "Forum" fails to address the real substance of the question from the non-transponder equipped pilot who has been given vectors to establish identification and position before entering an ARSA and wants to know if he must comply. Isn't the answer really a "yes"? Doesn't that make the ARSA a mini-TCA, like the writer says?*

*Richard J. Lewis*
*Red Bank, NJ*

If he wishes to enter ARSA airspace, yes, he must comply with ATC instructions. However, he may have the option of proceeding to his destination without penetrating the busy airspace of the ARSA.

The only requirement for operation in an ARSA is two-way radio communication with the air traffic facility in charge. The requirements for operation in a Terminal Control Area (TCA) are 1) an appropriate authorization from ATC; 2) a private pilot certificate; 3) an operable VOR or TACAN; 4) two-way radios; and 5) an altitude encoding transponder.

## INSTRUMENT CORNER

### • Instrument X-C Requirements

***The regulations which deal with cross-country distance requirements are vague and have been variously "interpreted." The only clear definition for the purpose of certification is that for a private pilot certificate you must have made one 300 nmi. flight with at least one leg of 100 nmi. and each remaining landing at least 50 nmi. from the last point of departure.***

***Question: What is the cross-country distance requirement for the instrument rating?***

***Richard Klein***
***Plano, TX***

**The cross-country experience requirement for an instrument rating is 50 hours of PIC cross-country time as a private pilot. The flights which comprise these 50 hours must be at least 50 nmi. from the point of departure to the point of landing.**

**Part of the required flight training for an instrument rating is cross-country flying in actual or simulated IFR conditions, including one trip of 250 nmi. There is no specific distance requirement for each leg, but the round-robin distance must be 250 nmi.**

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## Famous Flights *(continued from page 7)*

cooled engine started running hot. This had happened before, when rust in the radiator clogged the filter. Following the classic procedure to dislodge radiator obstructions, Hawker climbed to 12,000′, the maximum ceiling, cut the engines and nosed the plane over, plunging downward about half a mile before pulling out. This seemed to take care of the rust problem temporarily. The same maneuver would be used several more times before the flight was over.

When dawn broke, the hope of better weather died with the appearance of black thunderheads. After flying nearly 1,000 weary miles, it became obvious to Hawker that the overheated engine would not carry them much farther. Spotting a passing ship below, they ditched the airplane in the ocean and were picked up. The ship did not have a radio, so it was a week before anyone in England knew they were safe. They received a £5,000 consolation prize from Lord Northcliffe for making the attempt.

The second British contender, Fred Raynham, had readied the Martinsyde biplane (a converted military bomber) as soon as he received word the Sopwith was going. He too was plagued by misfortune as the soft ground kept the plane from getting enough speed to take off. On the third attempt it finally left the ground, only to be slammed back to earth by a strong gust of wind. The long awaited fight ended before it had really begun.

The field was now clear for the NC-4 to finish the last 783 miles from the Azores to the European mainland in a leisurely fashion with a fully repaired airplane. The crossing ended on May 27 in Lisbon, and the crew reached their ultimate destination, Plymouth, England, on May 31. The elapsed time was 24 days, the time in flight 57 hours and 16 minutes.

The first trans-Atlantic flight had now been accomplished by U.S. Navy pilots, who were acclaimed heroically on both sides of the ocean. But the Northcliffe prize was still waiting to be won, and the British had not given up yet. In England a last ditch effort was being prepared by two ex-military flyers, John Alcock and Ted Brown, who would undertake one of the epic journeys of aviation history.

(To be concluded in the March/April issue.) ■

Lost I might not be
If I'd used some LORAN-C.
Osborn

25/2

# FAA general aviation NEWS

March—April 1986

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U.S. Department
of Transportation
**Federal Aviation
Administration**

# FAA GENERAL AVIATION NEWS

**MARCH/APRIL 1986
Volume 25, Number 2**

Elizabeth Hanford Dole, *Secretary of Transportation*

Donald D. Engen, *Administrator, FAA*

Anthony J. Broderick, *Assoc. Admin., Aviation Standards*

John S. Kern, *Director, Flight Standards*

Carol S. Rayburn, *Manager, General Aviation and Commercial Division*

Gary D. Koch, Sr., *Manager, Accident Prevention Program Branch*

David Gelfan, *Editor*

P.A. Duncan, Louise Oertly, *Associate Editors*

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## BRIEFS

**SEAT PROBLEMS** Several recent accidents and incidents, which may have resulted from inadvertent movement of the pilot's seat at a critical phase of flight, have been reported in Cessna aircraft. FAA is proposing to issue an Airworthiness Directive that could require maintenance and inspection in accordance with Cessna Single Engine Service Bulletin. SEB85-6 (3/22/85); also possibly repositioning of the seat stops and installation of a seat lock warning placard.

Some 170,000 Cessna aircraft could be affected, including all single engine models and a number of light twins. Concerned persons may obtain further information or may forward comments on the proposed AD by writing to the Regional Counsel, FAA Central Region, Att: Rules Docket No. 86-CE-02-AD, Room 1558, 601 E. 12th St., Kansas City, MO 64106. Send comments by 5/21/86.

**STRUTS AWEIGH.** The strut-to-float attachment bolts on some types of float-equipped airplanes are susceptible to corrosion, especially in a salt water environment. Examining float attachment fittings carefully before the annual Spring launch, and replacing rust-weakened parts, can prevent the loss of a float at a critical point in flight.

**FLY-A-CONTROLLER.** Pilots who would like to show controllers problems encountered on the airborne side of the microphone are reminded that FAA encourages non-pilot ATC personnel to accept familiarization flights from civilian pilots. What's in it for you? The Aircraft Owners and Pilots Association has a free brochure by that name for its membership and for other pilots interested in getting into the fly-a-controller program. Available free from AOPA, 421 Aviation Way, Frederick, Md. 21701. Or call 800-872-2672.

**HARNESSING PASSENGERS.** A shoulder harness must be installed at all seats of normal, utility and acrobatic aircraft having passenger configuration of nine seats or less (excluding pilot seats) and manufactured after December 12, 1985. During takeoff and landing the harness, when available, must be fastened, in accordance with instructions provided by crewmembers. FAR Parts 23 and 91 have been appropriately amended.

# BACK TO BASICS

## Rooting out the preventable causes of pilot errors

Are you a safe pilot? From the time we start learning the basic fundamentals of flight we are educated, persuaded, and motivated to be a *safe pilot*. Yet, accidents occur and the pilot is usually the focal point of interest during the post-accident investigation conducted by the FAA and the Safety Board.

Even when not responsible for the primary cause of the accident, all too often the pilot is the source of "contributing factors" mentioned by investigators. These factors involve errors in basic operational procedures like running out of gas and forgetting to put the wheels down prior to landing. *Most aviation incidents and accidents are the result of regulatory noncompliance and/or ignoring simple, basic operational procedures which are taught, in the initial stages of pilot training.*

The continued practice of these basic fundamental procedures is necessary to assure aviation safety. Their execution becomes ragged if they are not reviewed periodically.

In January of this year, FAA, in cooperation with the aviation industry, launched a national "Back to Basics" program, refocusing attention on these fundamentals. The agency is urging all pilots, mechanics, air traffic controllers and other individuals who are actively involved in aviation activities, to turn their attention back to the fundamental building blocks of being a good pilot.

"Back to Basics" is a comprehensive three year effort to identify these fundamentals and keep them in the forefront of pilot consciousness.

> *Readers are invited to make free use of the artwork and articles in this magazine to promote interest in the Back To Basics campaign in their community. Additional copies of this issue are available for meetings.*

The FAA Accident Prevention Program is actively promoting Back to Basics throughout the country with outstanding pilot seminars featuring new audio-visual presentations, new films, and new speakers, including a number of celebrity pilots. "On Landings" is one of these presentations which is exciting overflow audiences. Produced by the General Aviation Manufacturers Association (GAMA) it is being utilized by the agency's Accident Prevention Specialists nationwide, by Accident Prevention Counselors, and by others in the aviation industry.

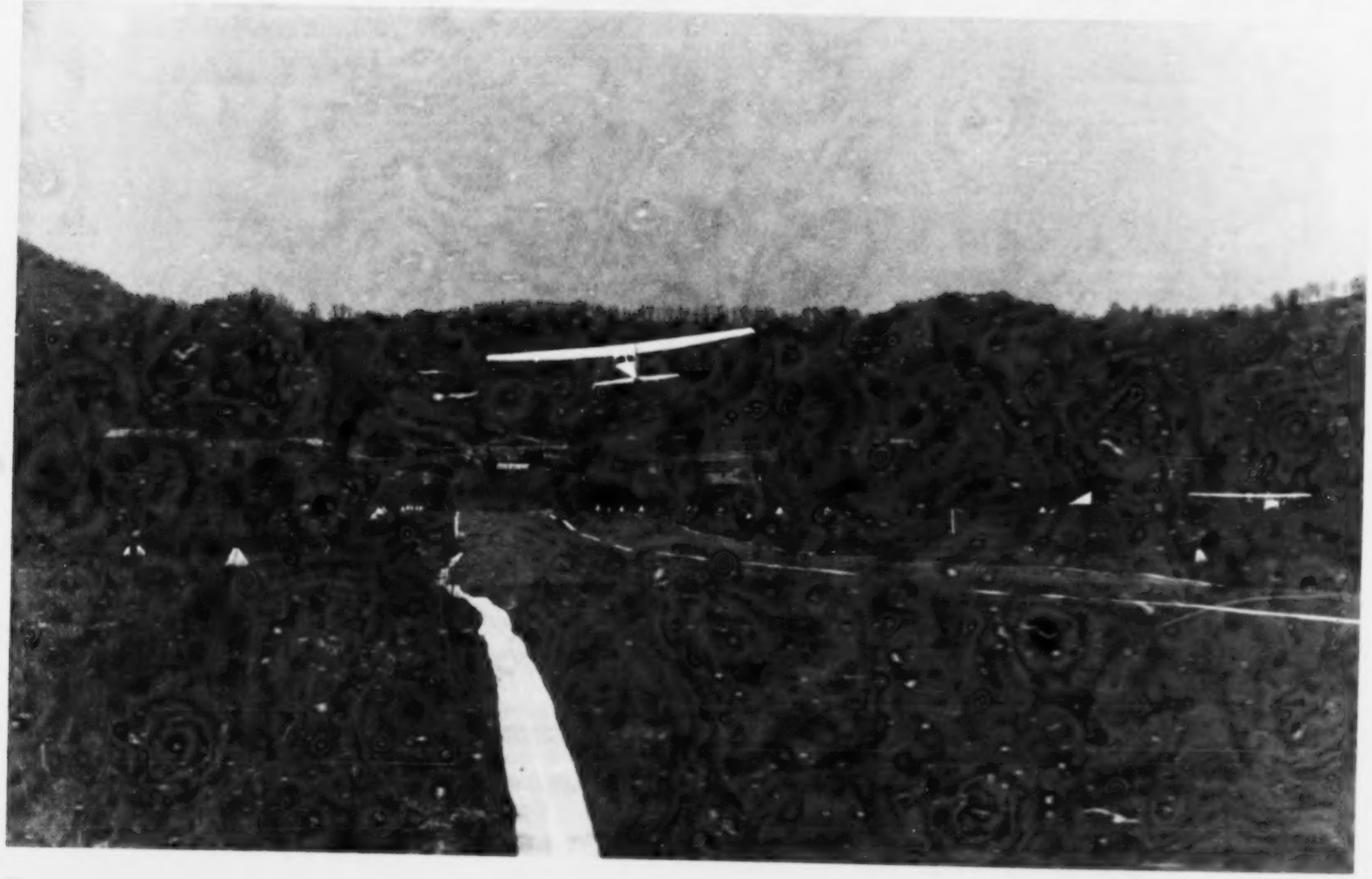
Landing and takeoff procedures are being emphasized by the Accident Prevention Program during the first quarter of 1986. The Back to Basics campaign will address a new topic every three months through 1988. It will seek to increase the pilots' knowledge of basic techniques and to improve attitudes through educational techniques.

Collision Avoidance Awareness will be highlighted in the second quarter of this year. Topics addressing weather-related accidents and fueling accidents will complete the 1986 programs. Future Back to Basics topics will include: Decision Making, Medical Factors, Emergency Procedures, Weather Briefings, Preflight, Maintenance, Stall/Spins, and Communications.

FAA's Accident Prevention Program is *your* program—it is not just for the inexperienced by any means. This program allows us all to communicate the "cause factors," "contributing factors," and just plain "goofs" that can turn a perfectly safe pilot into an unsafe pilot and possibly an unhappy statistic! ■

# From the Ground up

## *Problems that will lead to takeoff accidents are usually present before the aircraft starts to move*



In the course of a year about 500 general aviation pilots lose control of their aircraft after lifting off, and return to earth in an unplanned landing, with more or less serious consequences. Recent issues of the National Transportation Safety Board's "Annual Review of Aircraft Accident Data" disclose that about 20 percent of all accidents happen on takeoff, with the majority of these occurring during *initial climb*. Over the past five years initial climb accidents annually resulted in about 150 fatal or serious injuries to pilots or passengers, about 175 aircrafts destroyed and nearly 300 substantially damaged.

Is there anything we as pilots can do to protect ourselves from this kind of bodily harm? Obviously takeoff and initial climb cannot be avoided in flying. The procedure itself is not inherently difficult or dangerous, but the tolerance for error is at a minimal point: the engine is already at or near full power, airspeed is initially not far above stalling speed. Precise control and sound judgement are called for, as well as quick decisions in the event of a mechanical failure or traffic problem.

A quick glance over the 454 takeoff accidents reported for 1983 by the Safety Board (latest year for which completed data is available) suggests that the probable cause of most of these accidents is derived from circumstances beyond the pilot's control—i.e., "mechanical failure," "power loss," "contaminated fuel," "terrain conditions," "obstacles to flight," etc. However, a more careful scrutiny shows that the *great majority of these accidents could have been prevented if the pilot had been fully attentive during the preflight preparation and/or during the takeoff roll.*

Most of the mechanical failure or power loss accidents, for example, turn out to have been a consequence of a deficiency which was—or should have been—known to the pilot before lift off. A typical instance would be the case of a Piper (single engine) *Comanche*, who reported engine failure at an altitude of approximately 75 feet, after taking off from Cincinnati, OH. He made a gear-up landing and slid off the end of the runway, damaged the aircraft considerably and was fortunate to escape with minor injuries.

During the postcrash investigation, the engine was bench-tested and found to operate normally. The right tank was half full of fuel; the left tank had little, if any, usable fuel. The pilot had a habit—as many pilots do—of initially burning fuel out of his left wing tank when flying alone in the airplane, in order to reduce the effects of weight imbalance. He was certain that he had six to eight gallons left in the tank before taking off, but he had not actually looked—it was a cold November day, and he was not warmly dressed. He acknowledged the possibility of fuel starvation as a possible cause of the accident.

Most engine failure problems that surface during initial climb originate on the ground, as a result of inadequate preflight inspection. Contaminated fuel, for example, if not spotted as a result of thorough straining of all tank sumps, may not become evident during engine start-up, magneto check, or taxiing. Water, being heavier than fuel, tends to collect at the bottom of the sump; and in some airplanes—notably those with pronounced wing dihedral—water accumulation tends to collect at the inboard side of the wing fuel tanks as long as the airplane is on level ground. However, during the takeoff run and the initial climb, when there may be some rocking of the wings, unsuspected water may be drawn into the engine and cause it to misfire or quit. Proper and thorough draining procedures can prevent such failures.

Collision with ground objects during initial climb, (commonly a line of trees or wires beyond the runway) is often ascribed by the pilot to be poor engine performance and/or maintenance. Sometimes the pilot is correct as far as he goes in his analysis of the accident. Occasionally—not very often but *occasionally*, because maintenance people are also human and subject to error—an aircraft comes out of an annual inspection, overhaul or other type of maintenance in something less than an airworthy condition. The wrong type of sparkplugs or igniters may have been installed; intake and exhaust valves may have been improperly seated; carburetor linkage may have been left disconnected, etc. Even so gross an error as failing to replace drained engine oil happens once in a while.

This is certainly inadequate maintenance, but it need not necessarily lead to an accident *if the pilot accepts his responsibilities for making certain the aircraft, as it comes out of a shop, has not only been signed off as airworthy but is in fact airworthy.* He or she can read the maintenance log, note what was done, and observe while still on the ground whether the instrument readings correspond to normal expectations. It is possible, if you hurry, to take off in an airplane with no oil in the engine sump and the oil temperature needle not yet in the red, but not if you run the engine up properly first.

Similarly, it is possible to start up the engine, perform a thorough mag drop check, and still take off with an engine that is not achieving full power and may fail during initial climb to take you over ground obstacles that you normally clear with ease. A mag drop check, which is certainly important, gives you a comparative reading of magneto performance. In addition, the carburetor heat check will indicate whether the heating system is functioning; but since these checks are not made routinely at full power they do not tell you whether the engine is giving you 100 percent of rated power, or 90 percent, or 80 percent, etc. When it comes to clearing obstacles at the runway end, a very small power degradation can make all the difference between a safe climbout and a collision with trees or wires.

## "CLIMB TO CRUISE" ACCIDENTS—1983

This is a statistical analysis of all the "climb to cruise" accident contained in the National Transportation Safety Board's files for the calendar year 1983. It was derived from a computerized print-out of the accident briefs of 454 accidents provided to us by NTSB.

Mechanical failure, resulting from neglected maintenance: 79
Stall: 32
Fuel contamination: 50
Overload: 11
Wind conditions: 31
Impact with object (trees, buildings, wires, terrain, etc.): 58
Lack of familiarity with aircraft: 24
Ice on the aircraft: 5
Complete loss of power: 9
Unsuitable terrain: 35
Weather—fog, clouds: 11
Inadequate preflight: 25
Weight and balance: 3
High density altitude: 15
Carburetor ice: 3
Miscellaneous: 17
Undetermined: 46

*Planning the takeoff—first step to a good departure.*

Careful pilots take a quick look at the rpm indicator at the beginning of their takeoff run, when the throttle is wide open and rpm are at maximum indication. Some pilots take a quick second glance before lifting off. Consequently they are not likely to discover, during initial climb, that the tree line is approaching faster than the minimum clearance altitude. Getting an airplane off the ground with a sub-par engine can be much easier than getting it down safely in the remaining runway, once you discover you have difficulty after leaving ground effect.

Professional pilots use indicators other than the panel instruments to check on the flying capability of their aircraft before they leave the ground. Distance remaining to the end of the runway is always an important factor. The engine may be performing perfectly, but if the aircraft does not want to fly after the normal takeoff roll at maximum rpm, something is wrong and probably needs looking into.

There are many conditions which could downgrade aircraft performance on takeoff, which are not directly related to the engine. The wind may have shifted very abruptly and without warning. The tires may be soft. The runway may be soggy or slippery. Gust locks may not have been removed. A door or baggage hatch may have opened. You may have failed to read or respond to an item on the checklist. Unless you have established a go/no-go landmark that can be seen easily from the cockpit while taking off, you can easily leave yourself with too little runway to cope with, in the event that a safe takeoff and climbout cannot be accomplished.

Some pilots, unfortunately, succumb to the notion that if you can just get airborne, get the weight off the wheels, everything will be all right—airspeed will pick up, obstacles will diminish, and you will soar like a bird. It seldom works that way. If you pull the aircraft off the runway at less than recommended speed you are apt to stall as soon as you reach the boundary of ground effect. At that point you will decelerate unless you drop the nose, and if the aircraft porpoises around before achieving enough airspeed to accomplish the maximum climb angle, you may not be able to clear a five foot airport fence, let alone a tree line.

What it all comes down to is that the kind of problems that lead to takeoff accidents usually are not beyond the capability of the pilot involved. It is not skill, experience, or intelligence that is generally lacking, but *maximum attentiveness to everything that is going on prior to and during the procedure.*

Eternal vigilance—not just dollars and sense—is the price of an accident-free flying record. ■

# Expect the UNEXPECTED

*"Expect the unexpected!" is the motto of John H. Doster, Manager of the Allentown (PA) District Office who has over 40 years of experience as an inspector. This is the first article of a series of his flying reminiscences.*

## The 10 Cent Repair Kit

When I was just a little kid I had the pleasure of seeing Col. Charles A. Lindbergh in action. In 1928 he made a goodwill tour of the country and stopped in our town. They brought a gasoline truck out on the airport to refuel the *Spirit of St. Louis*, but he didn't let them run any hose into his airplane. The fuel was poured into five gallon cans, the gas was lifted up on top of the wing and poured into the tank through a funnel lined with a chamois filter. It was a slow process, but that's how he got all the way across the Atlantic in a single engine airplane—getting up in the dark that historic morning in 1927 and straining all those 450 gallons of gas by hand. I heard some pilots say the colonel was a nut about straining fuel, but he was no nut.

He knew that foreign matter can dissolve in fuel so you can't see it, until it settles out on vital parts, like plugs, or filters. He knew there's some fuel that has a little contamination and some that has a lot—but there's no such thing as uncontaminated fuel. Count on it!

That little lesson stayed with me when I took up flying later and I never got stuck way out in the boondocks with a fuel-starved engine—except for that one time in Montana. Maybe I was a little cocky. I'd started flying in my teens and the ink was hardly dry on my pilot certificate before I was carrying passengers, hauling freight—you name it and I'd fly it anywhere, anytime. I hadn't met an airplane I couldn't fly or fix, and by the time I'd piled up about 10,000 hours I'd begun to believe there wasn't much left for me to learn about flying. Wrong! The big lesson still in front of me was that when you stop learning its time to stop flying.

That nugget of truth came to me just after World War II, after I'd been sitting out on the prairie east of Billings for about 12 hours with a dead engine, the sun getting ready to set and the chill in the air starting to bite. I'd taken off from Billings early that morning headed for Wolf Point, which is located on the headwaters of the Missouri River in the northeast corner of the state—mostly open cattle range, hardly changed since the Lewis and Clark Expedition passed through it a century or so earlier.

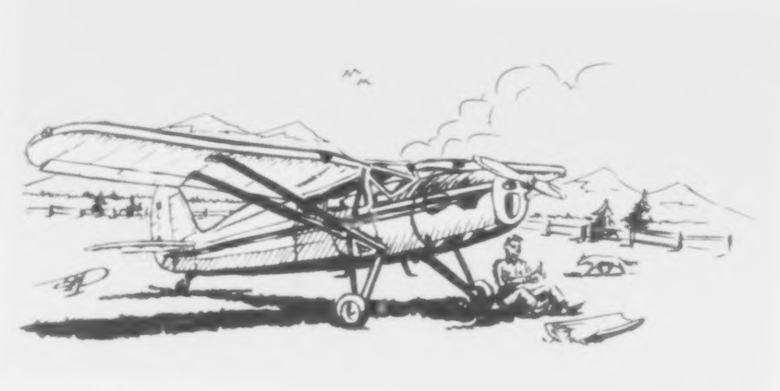
I was flying a rented Piper *Pacer*—the taildragger antecedent of the *Tripacer*—and I had checked it out thoroughly before starting out on the flight, accompanied only by my flight kit, a lunchbox and a coffee Thermos. I was churning happily along at 3,500 feet under blue skies when suddenly the engine ran rough and quit. As we were going down I put in a quick radio call to the fixed base operation at Billings, telling where I was and to send a mechanic. I was sure the problem was just fuel blockage of some kind. Hard to believe, after the sample I'd drained, but the fact was I got the plane wet and I hadn't any idea where or how it had been fueled.

I landed on the prairie without any problem. I selected an open area where I could be seen easily from any direction. Complimenting myself for handling the situation so cooly I sat down on a stump and relaxed. It was late winter or early spring—hard to tell one from another in Montana—and there was still some snow patches on the ground, but the sun was warm. I waited . . . and waited . . . In between waits I sent in one radio call after another, but no one answered. The old 3105 kc set had its limitations and the big tubes ate up the battery in a hurry.

I passed the time kicking the dirt and throwing snowballs at the prairie dogs, and before I knew it the sun was pretty low and the air was getting cold. I could hear the coyotes starting up a chorus on the butte. It was evident that help was not on the way and I was in for a long night in a short cockpit if I didn't do something quick about the airplane.

The problem was, embarrassingly enough, I had no tools. Not even a jackknife—nothing. At one time or another I must have had half a dozen wrenches and pliers and what have you stashed behind the seat, but somehow they had all wandered off somewhere. I couldn't even find a can-opener, let alone a screwdriver. The only hardware in my pockets was one thin dime.

Not much of a repair kit, but it worked to loosen the Zuss fastener, so I could open the cowl. The fuel filter was secured with safety wire and it's sharp ends cut my fingers when I tried to loosen them. With some careful rock pounding I got the fuel line loose, and sure enough there was no flow, with the tanks half full. So back to the filter bowl, which was made of metal, not glass. I held the safety wire between some flat rocks and bent it back and forth until it finally broke apart. Real high tech, cave men style.



The fine brass screen inside the sediment bowl was totally covered with a clear elastic film, which held back the fuel. After the screen and bowl were cleaned out I drained about two gallons of fuel, and buttoned her up.

By this time the battery was dead, so I chocked the wheels with rocks and swung the prop to get the engine started. I knew there was probably still contamination in the fuel, but I had to decide between spending the night with the coyotes and taking my chances upstairs. The coyotes lost.

After a quick look, in the fading light, along my landing path for obstacles I held my breath and took off. Once airborne I got to thinking so hard about giving someone a piece of my mind for not sending help that I forgot to listen for engine roughness, which fortunately didn't happen. By the time I got back everyone had left the airport and there was no one to listen to me rant and rave. The next day I was told my message had been misunderstood—and who would expect the Great Fixer to need help?

Before my next flight I made up a small tool bag from an old pair of denim pants. It contained a 6-inch crescent wrench, a pair of pliers with wire cutters, two screwdrivers and about 24 inches of brass safety wire. The kit is still in my travelling bag today, though the only use it has ever had was to fix clogged shower heads in motel rooms. It has been my security blanket; if I ever leave home without it, I know I will have another forced landing. Those gremlins know when you're carrying iron! ■

# Greasing It On Versus Dropping Hard

The landing phase of flight historically is where pilots are involved in the majority of accidents. Over the years, the National Transportation Safety Board (NTSB) accident statistics have placed this figure at approximately 40 percent of all accidents. The majority of the landing accidents occur during the *flare/touchdown* or *landing roll* portion of the landing maneuver. A look at landing accidents from NTSB files over a three months period, January, February and March 1983, discloses that 351 accidents occurred during the landing maneuver, with 278 of the total occurring during either the *flare/touchdown* or *landing roll*. Of these 351 accidents, 28 were fatal, resulting in a total of 62 fatalities.

After studying this accident data one might conclude that a problem exists with our initial training in landing techniques, or that pilots suffer a deterioration of skills and proficiency as time goes by.

Although accidents usually have multiple cause factors, in most cases one factor is deemed more significant than the others. Over the three month period mentioned earlier, three primary cause factors stood out. These were:

- Terrain conditions 46
- Collision with terrain or objects during a forced landing 39
- Pilot in command failed to maintain directional control 35

When we look at the 131 accidents (see table) which occurred during the flare/touchdown phase, we see that 21 of these accidents were the result of *hard landings*. Typically the aircraft flares and stalls out 10-15 feet above the runway as opposed to 1-3 feet above during the landing maneuver. Another example is when a projected flight path results in no flare or a late flare, causing the aircraft to make contact prematurely with the runway at a high sink rate. Rivaling hard landings in number are the 20 nose down or nosed over accidents, which no doubt stemmed from the initial hard landing.

In looking at the other primary causes, we find 46 inflight collisions with terrain and other objects, and 26 accidents which resulted from landing gear collapse. (A common cause of gear collapse is prior damage caused by a previous hard landing) as usual there was the one poor soul who simply forgot to put the landing gear down altogether.

**Landing Accidents**

**January-March 1983**
**Flare/Touchdown Phase**

| | |
|---|---|
| Hard Landings | 21 |
| Loss of Control | |
| Inflight | 2 |
| On ground | 2 |
| Inflight Collision | |
| with terrain | 33 |
| with objects | 13 |
| Gear Collapse | 26 |
| Nose Down/Over | 20 |
| Wheels Up | 1 |
| On Ground Collision | 3 |
| Undetermined | 10 |
| Total Accidents | 131 |

Statistics show very few accidents which were caused primarily by mechanical, electrical, or structural failures. However, 61% of the total 131 flare/touchdown phase accidents that occurred were the end result of a precautionary or forced landing. Something that cannot be learned from the statistics is the chain of events that occurred 10 to 30 minutes before the accident. The sharpness of skills and judgment that a pilot normally possesses may abandon him or her under times of stress—i.e. during an emergency situation.

A pilot who recognizes the potential for a forced or precautionary landing to occur, who prepares for such emergencies through recurrent training, and who becomes completely knowledgeable and familiar with aircraft emergency procedures, will not lose the sharpness of skills and judgment during the period of high stress. There is an old saying around aviation that "planning your flight should take *twice* as long as flying your plan." Another is that "the success of a landing depends largely on what is accomplished on downwind, base and final." In other words a good landing *demands* a good approach. We all recognize that in instrument conditions, *planning* your approach is a must, but the fact is that *all* landings should be planned, not taken for granted.

Interviews with pilots involved in landing accidents reveal that often the pilot felt during the approach that "things were not right," but continued anyway to touchdown. Many pilots have learned an expensive lesson from attempting the landing maneuver when a simple go-around procedure could have saved the day.

All pilots can learn from others' mistakes and by reviewing accident reports that contain the all too often heard phrases, "pilot lost directional control," "aircraft landed short," "aircraft landed long," "aircraft landed gear-up." Hopefully we can avoid finding ourselves in the same situation.

There seems to be a certain consistency in the pattern of landing accidents and cause factors. To break out of this mold we need to develop consistency in our recurrent training, plus a commitment to becoming totally familiar with our aircraft and a dedication to maintaining a high level of personal well being and awareness. We need to break down the landing maneuver into a series of fundamental flight sequences that dovetail into one another. Bad landings appear to happen at the last moment, but if you look back honestly and carefully you can see the problem began minutes or miles before the threshold. A hard landing tells you to take a hard look at what you were doing back there. ■

# PILOT CONTROL OF AIRPORT LIGHTS

## The key to lighting up many dark skies is on your microphone

If you have ever been obliged to land at an unlighted airport that was obscured by darkness or clouds and possibly surrounded by obstacles to navigation in the form of unyielding rock, you might have been willing to give up your dearest possession for some kind of magic wand that would enable you to illuminate a few light bulbs in the vicinity of a runway—right? And with good reason.

Accidents associated with insufficient (or non-existent) lighting at the airport seem to proliferate in the late winter or early spring, perhaps due to the eagerness of winter-inactive pilots to be on the wing again. Unplanned night landings may be brought on by fuel or engine problems, or by an abrupt change in the weather; but the failure to land safely may be due to *unfamiliarity with the options available to the airborne pilot for turning on airport lighting.*

In many of these accidents the pilot actually does have a kind of magic wand at hand, in the form of a radio microphone. Simply tuning in the "CTAF" or UNICOM frequency and clicking the microphone a few times will turn on runway and approach lights at hundreds of unattended airports.

Earlier this winter the pilot of an *Aero Commander* attempted a landing at an uncontrolled airport in northern Wisconsin in instrument weather shortly after dark. Observations for the area included a 600 foot overcast and visibility one mile in rain. The pilot attempted an NDB approach but flew over the airport instead of landing and failed to execute the missed approach procedure. The flight ended in a fatal crash about a mile south of the field. The airport was unattended at the time, but a pilot-activated system of runway lights for the hard surface runway, had been recently commissioned and NOTAMed. Witnesses informed investigators that the runway lights did not come on.

Pilot-activated lighting systems have become popular because of their advantages in terms of economy and utility. Constantly burning airport lights can consume a tremendous amount of electricity in the course of a day's use, particularly if they are set at medium or high intensity. The savings in electrical power when the lights are used only when needed are significant. Also, the lights last longer, and need less service when used on demand only. Furthermore, "air-to-ground radio control" allows the pilot to adjust the intensity of the lights to suit the conditions of use (some pilots may lose night adaptation of the eye from the glare of unnecessarily bright approach lights, which make it hard to see the runway after passing the threshold.

*Activating approach lights gives the pilot a better opportunity to judge distance, altitude above ground, drift, etc. than runway lights alone.*

Although air-to-ground lighting control was initiated at small, uncontrolled airports the practice spread to larger airports with part-time control towers or flight service stations. The procedure for controlling the lights has been standardized.

**ABBREVIATIONS**

**VASI**—Visual Approach Slope Indicator
**REIL**—Runway End Identifier Lights
**MIRL**—Medium Intensity Runway Lights
**HIRL**—High Intensity Runway Lights
**LIRL**—Low Intensity Runway Lights

**Restrictions on Radio Control.** The pilot may not activate airport lights during any period when this responsibility is in the hands of appropriate persons on the ground. During periods of airport attendance, the lights may be controlled by an air traffic control tower, a flight service station, or the airport management. Obstruction lights and airport beacons may not be radio controlled.

**Control Procedures.** The pilot tunes his communications radio transmitter to a given frequency and clicks the microphone three, five or seven times within a time span of about five seconds. This turns the standard radio-controlled lighting systems on (or up) to a selected intensity, in accordance with the options given in Table I.

Once activated, the radio-controlled lights will stay on at the keyed intensity for 15 minutes. At the end of this 15 minute period the lights will automatically turn off or return to a preset brightness. The system may be recycled at any time for another 15 minute period at any available intensity. However, the lighting system may not be turned off by radio control before the end of the 15 minute cycle, except that some runway end identifier lights (REILs) may be changed to OFF or to a lower intensity by a reduced number of clicks (see table).

**Frequency Selection.** The air-to-ground radio equipment is in the frequency range of 118–136 MHz. Whenever possible the Common Traffic Advisory Frequency (CTAF) will control the lights. At unattended airports the UNICOM frequency will normally be used; at other airports it may be the tower local control frequency or the flight service station frequency.

Current frequency information is published in the FAA Airport/Facility Directory, which contains a glossary of abbreviations for the various lighting systems. Availability of radio-controlled lighting systems will also be depicted on sectional aeronautical charts by the encircled letter Ⓛ. Instrument approach procedure charts also indicate the presence of radio controllable lights, if the system is operated in accordance with FAA standards. A diagram of common approach lighting systems is shown inside the back cover of the approach charts and in the Airman's Information Manual.

At airports where approach lights and runway lights are both radio controlled, the intensity of both systems are increased and decreased simultaneously by radio signal. This is a change from previous standards which called for radio control lighting intensity only for the approach lights. On systems where the intensity of lights is automatically controlled by a photocell or other means, radio control will simply energize the system and allow the intensity to be selected automatically.

**Crosswind Runways.** At some airports with radio-controlled lights, a crosswind runway may have continuous low or medium intensity runway lighting at night, while the principal runway(s) are left dark, except when radio activated.

**Day Mode.** An energy-saving procedure, known as "day mode," is configured with radio-controlled lights at some airports, in a manner which does not allow runway lights (other than VASIs and REILs) to be turned on during daylight hours. This mode may be activated by a photocell or manually.

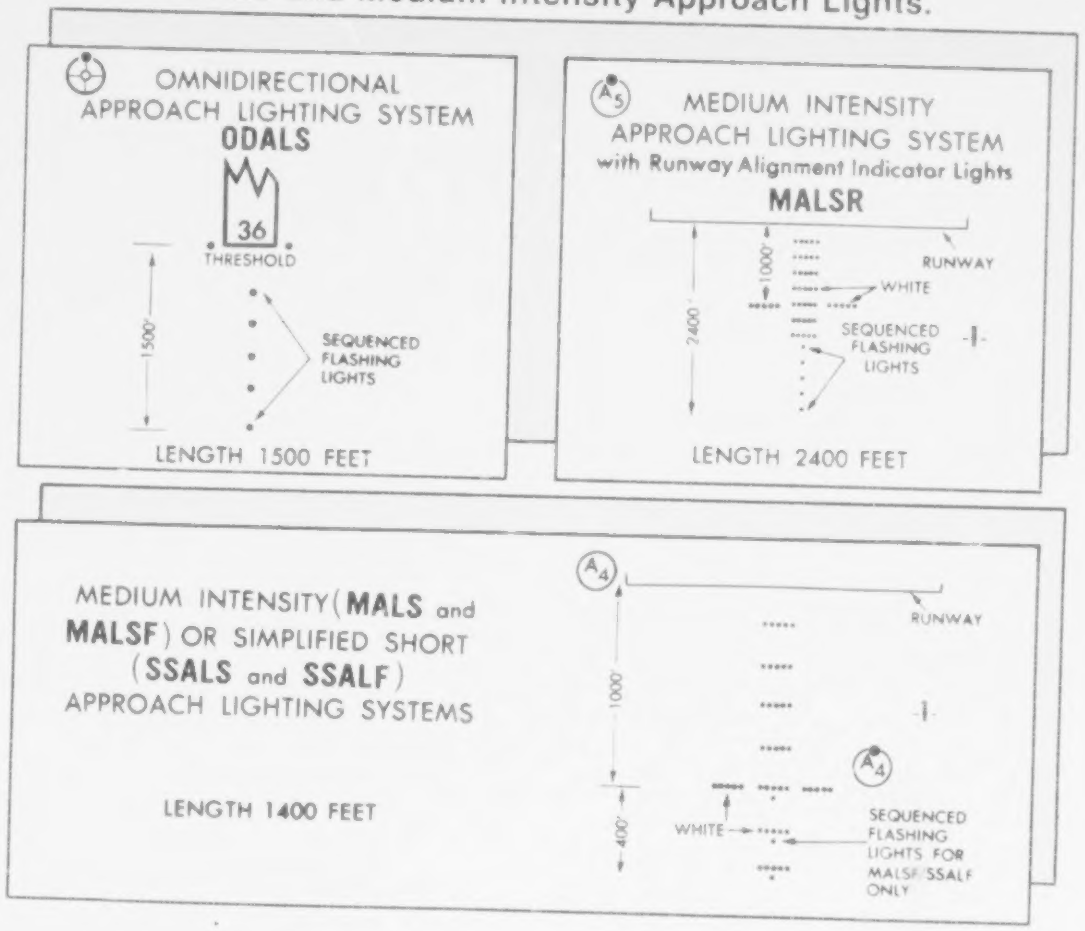
In areas where in the daytime there may be considerable voiced use of the frequency which activates airport lights, these lights may be inadvertently turned on or down as a result of three random microphone clicks in a five second period. If this becomes a problem, the three-click setting for radio control can be de-activated during the day and restored at night.

*(continued on back cover)*

**Table I. Standard Lighting Control Options.**

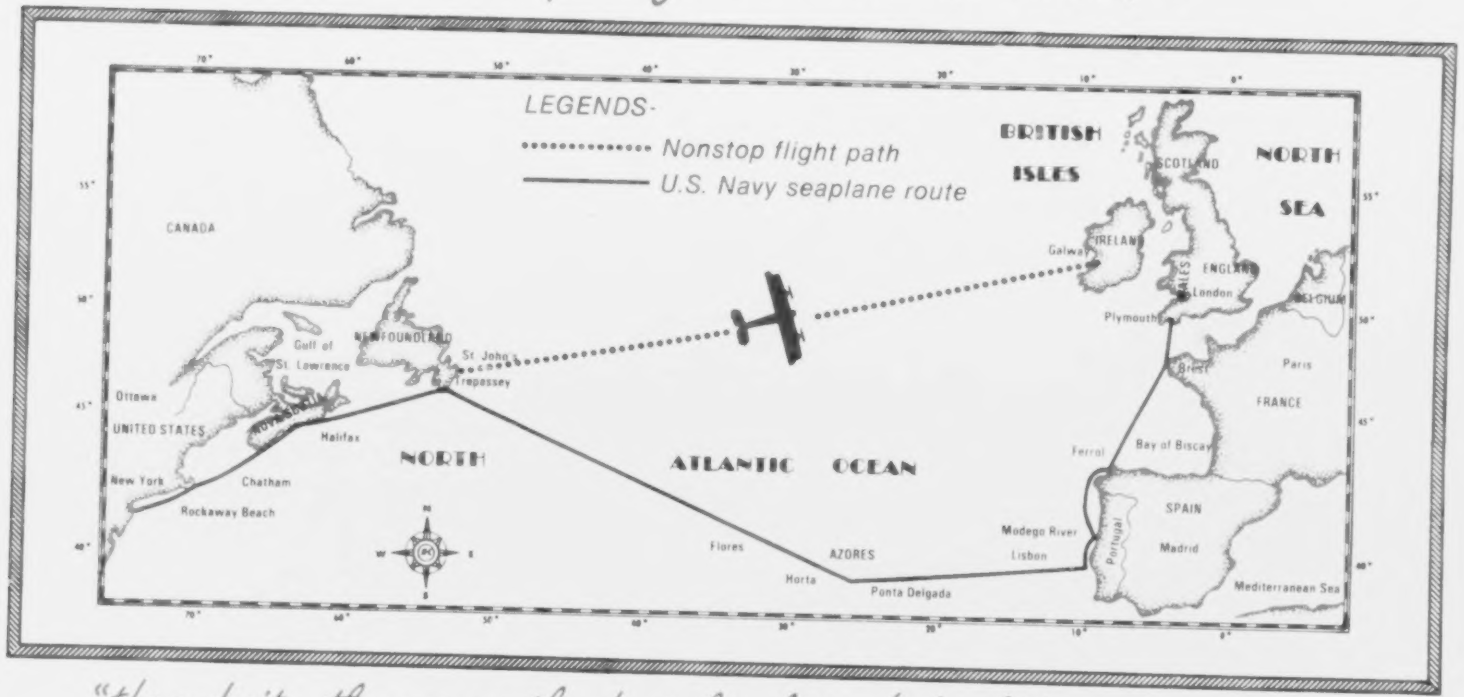
| Lighting System | Number of intensity steps | Status during idle periods | Intensity step selected per no. of microphone clicks | | |
|---|---|---|---|---|---|
| | | | 3 Clicks | 5 Clicks | 7 Clicks |
| **MALS** | 2<br>3 | Off<br>Off | Low<br>Low | Low<br>Medium | High<br>High |
| **High Intensity Approach Lights** | 5 | Off | 1 or 2 | 3 | 4 or 5 |
| **Edge Lights** | | | | | |
| **Low Intensity** | 1 | Off | On | On | On |
| **Medium Intensity** | 3 | Off or Low | Low | Medium | High |
| **High Intensity** | 5 | Off or Low | 1 or 2 | 3 | 5 |
| **Taxiway Edge Lights** | 1<br>2<br>3 | Off<br>Off<br>Off | On<br>Low<br>Low | On<br>Low<br>Medium | On<br>High<br>High |
| **Runway Centerline, Touchdown Zone Lights** | 5 | Off | 1 or 2 | 3 | 5 |
| **Taxiway Centerline Lights** | 3<br>5 | Off<br>Off | Low<br>1 or 2 | Medium<br>3 | High<br>5 |
| **REILS** | 1<br>2<br>3 | Off<br>Off<br>Off | Off<br>Off<br>Low | Off<br>Low<br>Medium | On<br>High<br>High |
| **Visual Glideslope Indicators** | Photocell Controlled<br>3<br>5 | Off<br>Off<br>Off | On<br>Low<br>1 or 2 | On<br>Medium<br>3 | On<br>High<br>5 |

**ODALs and Medium Intensity Approach Lights.**


OMNIDIRECTIONAL APPROACH LIGHTING SYSTEM
ODALS
36
THRESHOLD
1500'
SEQUENCED FLASHING LIGHTS
LENGTH 1500 FEET
A5
MEDIUM INTENSITY APPROACH LIGHTING SYSTEM with Runway Alignment Indicator Lights
MALSR
1000'
2400'
RUNWAY
WHITE
SEQUENCED FLASHING LIGHTS
LENGTH 2400 FEET
MEDIUM INTENSITY (MALS and MALSF) OR SIMPLIFIED SHORT (SSALS and SSALF) APPROACH LIGHTING SYSTEMS
LENGTH 1400 FEET
A4
RUNWAY
1000'
400'
WHITE
A4
SEQUENCED FLASHING LIGHTS FOR MALSF/SSALF ONLY

# FAMOUS FLIGHTS

## *First Nonstop Flight Across the Atlantic*



*"the audacity, the courage, the physical qualities of the old heroic bygone times"*

His British compatriots thought his whole idea was crazy. Since March of 1919 two competitors had had crews and airplanes in Newfoundland poised for takeoff. The chances of a latecomer winning the "Great Trans-Atlantic Race" prize appeared non-existent.

This latecomer to the competition was 27-year-old Captain John Alcock, formerly of the Royal Naval Air Service and a veteran combat pilot. He had received his pilot's license while still in his teens and had logged more than 1,000 hours before he joined the World War I effort. He soon became bored with his flight instructor duties and was reassigned to combat.

Soon after the war Alcock went to work for Vickers as chief test pilot. He became intrigued with the *Vimy*, a bomber which had come into production just before the war ended. This sturdy biplane with its 67' wing span and two 350 hp Rolls Royce engines would be perfect for the trans-Atlantic attempt. Alcock decided that if the plane were stripped of its gun mounts and bomb racks, and additional gas tanks were incorporated in the bomb bays, it would increase the fuel range to 2,400 miles—enough to cross the North Atlantic between Newfoundland and the British Isles, if the navigation was true.

Other modifications included eliminating the tandem cockpits by sealing one over and enlarging the other to hold both crewmembers. The best thing about these changes was that they could be accomplished in two weeks.

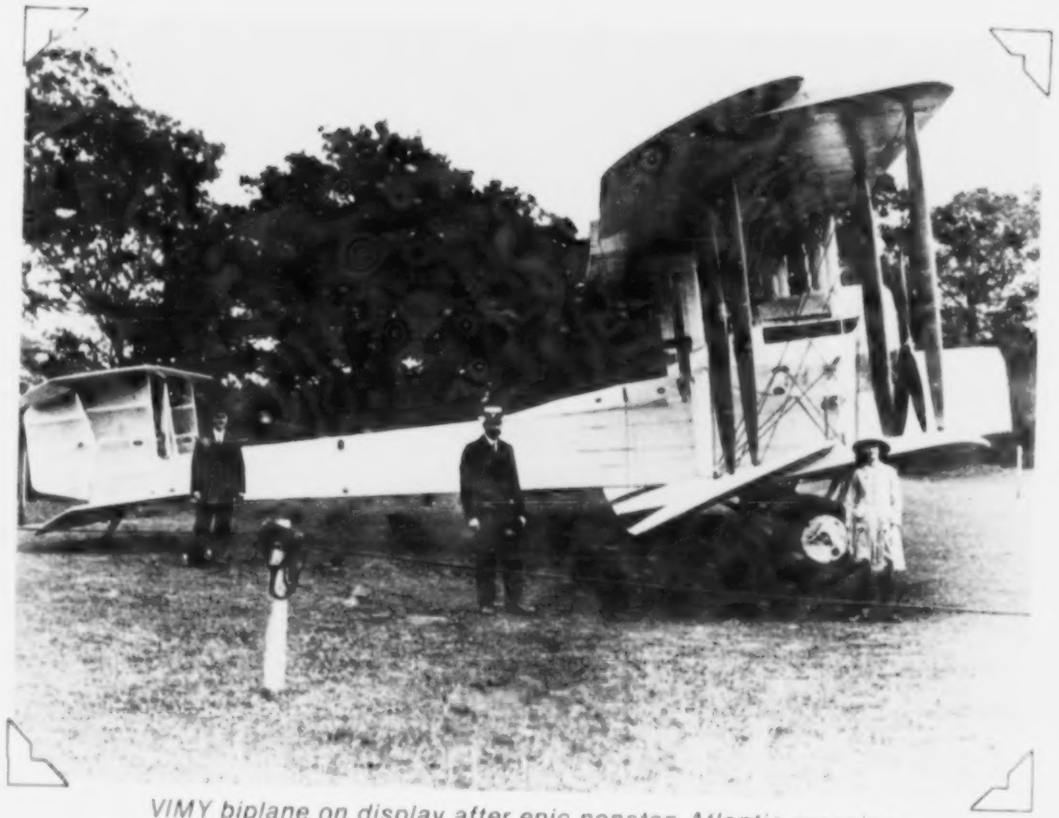
Capt. John Alcock, Lt. Arthur W. Brown.

Realizing the publicity value of the venture, the directors of Vickers agreed to finance the flight. All Alcock needed now was a navigator.

It was strictly by accident that Alcock was introduced to Lieutenant Arthur (Ted) Brown. He had gone to see the plant manager about installing the extra fuel tanks at the same time Brown was being interviewed for employment. When Brown found out about the proposed trip, he offered his services as navigator. He had been a gunner in the RAF, and his plane had been shot down by German fighters. Brown was shot in the foot while attempting to evade capture by the Germans, and the wound resulted in a permanent lameness.

To relieve boredom while he was incarcerated, he studied navigation, charting a mythical trans-Atlantic trip that he one day hoped to make. At the war's end, when the London *Daily Mail* renewed its offer of a £10,000 ($50,000) prize for the first nonstop aerial crossing of the Atlantic, Brown offered his services as a self-taught navigator to the major British aircraft manufacturers. However, they thought his lame foot would be a hindrance in the cockpit and did not consider him. Alcock, however, considered Brown the answer to his prayers—a trained available navigator with all the charting and planning for the route already in his mind. Brown got a job with Vickers, but not as an engineer as originally planned.

By early May Alcock and Brown followed the other competitors' path to Newfoundland,



VIMY biplane on display after epic nonstop Atlantic crossing

where bad terrain and poor weather had grounded the impatient crews of the earlier arrivees. They too found the weather uncooperative and locating a suitable runway in the hilly, boggy, craggy island seemed an impossibility.

On May 18, the ill-fated Sopwith and Martinsyde attempts were made. The Martinsyde biplane was demolished on takeoff; the Sopwith went down two thirds of the way across the ocean but the crew was rescued by ship.

Alcock and Brown waited until June 14 before weather forecasters predicted clear skies and westerly winds extending all the way to Ireland.

On the day of the 14th, the winds delayed shifting west until noon, when Alcock finally gave the word to pull the chocks. The engines started on the first attempt and they were off down the runway. The airplane sluggishly picked up speed and for a moment looked like it would be a repeat of the Martinsyde takeoff failure. However, at the last moment the *Vimy* lifted into the air, narrowly missing a hedge at the end of the runway.

Increasing their ground speed by 30 mph, the westerly wind would be one of the few weather advantages they would have during the trip. Fog was encountered shortly after clearing land and the cloud layer soon was higher than they could fly. They would have to rely on dead reckoning for most of the trip.

When they tried to tap out a message of their progress and check their location, there was no response. Plenty of chatter, but no acknowledgement of their message. They soon discovered that the small propeller that powered the wireless' wind-driven generator was missing. It was located on a wingtip, so that there was no way they could have fixed it even if they had a spare part.

The next calamity occurred when their exhaust pipe broke loose and eventually fell off, letting the exhaust flame stretch out toward the wing. Both men watched helplessly, expecting the plane to go up in flames at any moment—but nothing happened.

Shortly before dusk the *Vimy* popped into the sunlight. Quickly taking navigational readings with Brown's sextant, they found they were only slightly off course and made the appropriate corrections. During the night the stars would play hide-and-seek with them but appear long enough to get occasional bearings. By midnight they had flown over 1,000 miles—nearly two-thirds the way across.

By dawn the two men were exhausted and chilled to the bone. During the night the batteries for their electrically heated flight suits had failed. If they were hoping for the sunlight to thaw them out, nature had other ideas. With dawn came a fierce thunderstorm, releasing rain, wind, and hail on their open cockpit.

The storm had turned to sleet, obscuring any attitude reference, when a new nightmare struck. Suddenly the plane started to plummet towards the ocean, apparently because of ice buildup. At 500 feet they broke through the clouds. Alcock pulled back on the control column finally leveling the plane off. Opening both throttles wide, he ascended to 9,000 feet but the controls were still sluggish and the engine labored. Using a flashlight to inspect the airframe, a quick look told them that ice was starting to block the engine air intake duct.

Ted Brown climbed out of the cockpit onto the wing, despite Alcock's efforts to keep him in. Inching along with his crippled leg and hanging on to the struts, he finally reached the engine and hacked the ice away from the right air inlet with his jackknife while the propeller whirled only inches away. Inching back the way he came and crawling forward the same distance again to the left inlet, he managed to free the ice and return safely to the cockpit.

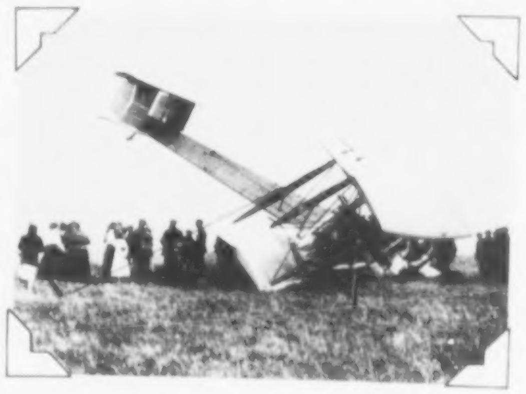
At 11,000 feet the sun shone long enough to allow another navigational fix. They were slightly north of their intended course but close to Ireland. Heading in a southernly direction toward Galway, they sighted the Irish island of Eshal in the distance. Brown grabbed his charts and found they were only 25 miles off course.

They chose a field near the Clifden wireless radio station in Galway and shot two flares from a Very pistol to let someone know they had arrived. The green field had no obstructions on it and they came down for a straight-in approach. Cutting the engines, easing back on the control column, and breathing a sigh of relief, Alcock felt the wheels touch down. They jerked to a sudden halt, tipped over and came to rest with the plane's nose buried in the ground.

The beautiful green field turned out to be an Irish peat bog. Fortunately, neither man was hurt. They had been flying for 16 hours and 12 minutes, covering over 1,900 miles.

To Brown the greatest disappointment was that no one in Ireland seemed to be aware they were making the flight. But eventually the local farmers accepted their story and spread the word; a cheering London crowd welcomed them home. Besides getting their £10,000 prize, they were also knighted by King George V. The *Vimy* received a place of honor in the Science Museum in South Kensington. Winston Churchill, then the Secretary of War, declared that Alcock and Brown's feat ". . .shows that while we have become more powerfully equipped with engineering and scientific apparatus, we have also preserved as a race the audacity, the courage, the physical qualities of the old heroic bygone times."

The flight of the *Vimy* proved that nonstop trans-Atlantic flight was possible, but it would be 20 years before the state of the art caught up with human courage—and commercial flight across the ocean became a reality. ■



# FOREST SERVICE LANDING STRIPS

## The ultimate in no-frills runways

Birds are not the only flyers who migrate once Spring's warmer weather arrives. Aircraft are now coming out of winter storage and pilots are heading towards all points of the compass in search of a change of scenery. In the quest to get away from it all, some of the more popular destinations are the National Parks, Forests, and Wilderness Areas dotting the U.S. landscape. Most pilots know that off airport landings are prohibited on Federal land, but many pilots are unaware of the numerous forest management airstrips which can be legally and safely used by visiting civilians, provided that you know *where* these strips are, *what* they are, and *how* to use them.

Back country airfields are usually unimproved landing strips with perhaps the bare essentials of runway markers and the remnant of a wind sock—by no means readily distinguishable from the air. These strips are often inaccessible by surface transportation other than horse or mule back. Usage is largely determined by weather conditions prevailing at the time. The U.S. Forest Service controls about 100 of such strips on National Forest Land and in Wilderness Areas. (Forest management airfields in the National Parks are not open to the public.)

The airstrips on National Forest Lands are available for public use, unless otherwise marked on the sectional charts. They are mainly firefighting bases, but are also used by local FBO's who fly in anything from rafting to hunting parties, using small, single engine aircraft with STOL characteristics. Runway lengths range from roughly 1,000′ to 2,500′, and the approach and departure routes are often over rugged and unforgiving terrain, demanding skill, currency, and experience.

In the warmer summer months some strips can only be used during early morning or late evening, as high field elevation, coupled with high temperatures adversely affect aircraft performance and may make landing and takeoff unsafe. *Use is always at the pilot's own risk.* During the winter months the fields are closed and must be approved for reopening each spring by Forest Service personnel. This means that each field must be surveyed on foot or horseback to check for firmness and maintenance needs. Dropping in smokejumpers sometimes is the only practical way of doing a field check.

It is important to remember when flying over these National Forest, Parks, and Wilderness Areas that aircraft in transit are requested not to fly below 2,000′ AGL, and that landings are permitted only on non-restricted airports shown on sectional charts. Wilderness or Primitive Areas are protected by a Congressional mandate which strictly forbids all electrical, motorized, or vehicular equipment from these lands. (For more information, see "Wilderness Flying," Sept./Oct. 1983, and "Aerial Tours Over Protected Land," July/August 1985).

The Forest Service strongly recommends contacting their appropriate regional office to obtain flight information if planning to fly in unfamiliar territory. The Forest Service has an Aviation Officer assigned to each of its nine regions. Under his supervision are the safety officers for each forest, which is further divided into districts, with a Forest Aviation Officer assigned to each of these.

The Regional Aviation Officers will be able to answer questions directly, or refer the pilot to the best information source. A phone call or a letter inquiring about terrain and conditions before setting out on a trip could save the pilot hours of delay, and help avoid possibly serious flight hazards. In some states (Idaho for example) charts and airport directories are available for the asking.

Flying the back country airstrips can be an exciting adventure and devoid of mishaps—if you really know what to expect. ■

### LIST OF U.S. FOREST SERVICE REGIONAL AVIATION OFFICERS

Northern Region
(States: MT, ID, ND)
5665 Highway 10W
Missoula, MT 59802
406-329-4903

Rocky Mountain Region
(States: CO, NE, SD, WY)
11177 W. 8th Avenue
Box 25127
Lakewood, CO 80225
303-236-9566

Southwest Region
(States: AZ, NM)
517 Gold Avenue, SW
Albuquerque, NM 87102
505-842-3354

Intermountain Region
(States: ID, NV, UT, WY-Teton)
324 25th Street
Ogden, UT 84401
801-625-5511

California Region
(State: CA)
2020 Hurley Way
Suite 130
Sacramento, CA 95825
916-921-5543

Pacific Northwest Region
(States: OR, WA)
319 SW Pine Street
P.O. Box 3623
Portland, OR 97208
503-221-2931

Eastern Region
(States: CT, DE, IA, IL, IN, KS, MA,
ME, MD, MI, MN, MO, NH, NJ,
NY, OH, PA, RI, VT, WV, WI)
310 West Wisconsin Avenue
Room 600
Milwaukee, WI 53203
414-291-3632

Southern Region
(States: AL, AR, FL, GA, KY, LA,
MS, NC, OK, PR, SC, TN, TX, VA)
1720 Peachtree Road, NW
Suite 750
Atlanta, GA 30361-9102
404-347-4243

Alaska Region
(State: AK)
Federal Office Building
P.O. Box 1628
Juneau, AK 99802
907-586-8866 ■

*Wyoming's Bridger National Forest south of Yellowstone Park.*

*Riverside meadows "airport" in southern Montana.*

*Allison Ranch strip, Idaho's Salmon River National Forest.*

# AvNEWS

**DONALD's DUCK.** On December 17, 1936, manufacturer Donald Douglas introduced a new kind of airplane that would make air transportation profitable and practical. Fifty years and 10,654 airplanes later, a few thousand of the venerable DC-3's are still flying. The *Gooney Bird* has done everything from dropping paratroopers and towing gliders during World War II to hauling passengers, troops, and executives—as well as every type of freight imaginable.

## ALCOHOL TEST FOR CREWMEMBERS MAY BE MANDATORY

FAA has completed action on several rule changes to FAR Parts 61, 63 and 91 which will make possible chemical testing of crewmembers suspected of flying while under the influence of alcohol.

These regulations already prohibit any crewmember (pilot, flight engineer, navigator or flight attendant) from entering upon duty status while under the influence of alcohol or within eight hours of consuming any alcoholic beverage, or while having 0.4 percent or more of alcohol in the bloodstream. However, enforcement has been difficult, as FAA inspectors lack the training or authority to test anyone for alcohol.

The current rule changes, which become effective April 9, 1986, will require crewmembers to submit to a blood level alcohol test when so requested by an authorized law enforcement officer (many civil jurisdictions have laws against flying after drinking which parallel the FARs.) Any crewmembers who refuse to be tested, or to make the results available to FAA, face a possible suspension or revocation of certificate or other enforcement action by FAA.

The agency is pursuing a vigorous educational program on the effects of alcohol abuse in aviation. Nearly 8% of all accidents since 1968 involve alcohol.

## MINIMUM EQUIPMENT LISTS FOR MULTI-ENGINE AIRCRAFT

On March 13, 1986, FAA reinstated Section 91.30 of the Federal Aviation Regulations. This rule permits the operation of multi-engine aircraft with certain instruments and equipment inoperable, in accordance with an FAA-approved minimum equipment list (MEL).

Applications for an MEL should be made with the nearest Flight Standards District Office. Information on this subject is also available from Tom Stuckey or John Lynch of the Project Development Branch (AFS-850), at FAA Headquarters, 800 Independence Ave., SW, Washington, DC 20591. Telephone number 202-426-8150.

FAA is currently working on a related rulemaking project to provide relief for other categories and classes of aircraft, such as single-engine airplanes and rotorcraft. This project should be completed by the fall of 1986.

## LATEST AIRMAN PUBLICATIONS

### Control Locks

Guidance on means of warning pilots about control lock engagement can be found in Advisory Circular 23.679-1, "Control System Locks." Free from DOT Subsequent Distribution Unit, M-494.3, Washington, D.C. 20590.

### Obstructions

Advisory Circular 70/7450-1G provides updated information on the standards for marking and lighting of obstructions. Free from the DOT.

### Aircraft ID

Information and guidance for the "Installation, Removal, or Change of Identification Data and Identification Plates on Aircraft Engines" is provided in Advisory Circular 45-3. These two circulars are free from the above DOT address.

### Technical Reports

Sixty aviation-related technical reports are available to the public from the national Technical Information Service. For a free list of the publications, their prices, and how to order contact FAA's Office of Public Affairs, APA-300, 800 Independence Ave., S.W., Washington, D.C. 20591; (202) 426-8521. Ask for News Release FAA 35-85.

### Cabin Safety

A final report on the Flight Safety Foundation's cabin safety conference and workshop held last year is available through the National Technical Information Service. The 200-page report contains transcripts of presentations from the conference by technical experts in cabin safety and passenger protection. Contact NTIS at (703) 487-4650 for price information and to order report number DOT/FAA/ASF100-85/01, "Proceedings of Cabin Safety Conference and Workshop."

## NEW POLICY STATEMENT ON AIRPORT OPERATIONS

FAA has published a policy statement which proposes to clearly define its area of responsibility in airport matters, and the principles which should govern the agency in exercising its authority. Public meetings to discuss this proposed policy have been held in Washington, D.C. and Denver, and a third meeting is scheduled for Los Angeles on April 23, 1986, at the Hacienda Hotel in El Segundo.

Historically local authorities have developed and operated airports, while FAA exercised responsibility for air traffic control, navigation and communication systems. However, in view of its Congressional authorization to determine efficient and safe use of the airspace, the agency reserves the right of final decision in such matters as runway and taxiway capacity levels, environmental impact and traffic compatibility.

Anyone wishing to make a statement in person at the Los Angeles hearing should advise Carol Strong, FAA Office of Policy and Plans, APA-400, 800 Independence Ave., S.W., Washington, D.C. 20591 (202-426-3331) as soon as possible. Copies of the policy proposal, as published in the Federal Register for January 22, 1986 may be requested from Colleen Cleary, APA-430, at the same FAA street address. Telephone: 202-426-1960.

### • Joint Effort

*It should be noted that the Navy NC-4, which won the Trans-Atlantic Air Race in 1919 (Jan/Feb 86 issue), was flown by a Coast Guard pilot—a feat that is recognized by a plaque on the NC-4 display at the Naval Aviation Museum in Pensacola. Coast Guard LT Elmer F. Stone earned his naval aviator wings in April 1917 at Pensacola and was designated CG Aviator No. 1. Unfortunately, Elmer was designated before the Coast Guard acquired any aircraft, so he was assigned to temporary duty with the Navy.*

*Stone was at the flight controls for the historic crossing. USN LCDR Albert C. Read was the "Aircraft Commander" under Navy rules, but preoccupied himself with navigating as was then the custom. LT Stone was the designated pilot, and LT Walter Hinton, USN, was Stone's co-pilot.*

*Another valuable crewmember was radio officer Ensign Herbert C. Rodd, USN Reserve Forces, whose resourceful use of the limited radio equipment helped NC-4 on course.*

*CDR Terry W. Sinclair, USCG*
*McKinleyville, CA*

Thank you for the additional information. Part II of the Trans-Atlantic Air Race is on page 11 of this issue.

Elmer F. Stone, USCG

### • Address Change

*In your May/June 1985 issue you printed the address of the commercially published General Aviation News. However, that address has changed to: GAN, P.O. Box 110918, 1712 Belt Line Rd., Carrollton, TX, 75011-0918. I thought you might be interested.*

*Don Jewel*
*Harrisburg, PA*

### • CZ's Revisited

*In your reply to William Cowan, Jan./Feb. "Forum," you probably didn't write all that you were thinking. This resulted in a slightly misleading answer. A person doesn't have to "stay out" of a control zone "if the ceiling is less than 1,000', he simply may not fly beneath a ceiling of less than 1,000', nor may he enter the airport traffic area, as you explained, but he can fly in the control zone above the airport traffic area if he maintains a cloud separation per FAR 91.105 and has 3 miles, or 5 miles, as appropriate, visibility. Even in visual meteorological conditions ATC can refuse entry into a lot of airspace, but the control zone isn't one of them.*

*Byran W. Carpenter*
*San Antonio, TX*

You are correct. A VFR pilot may transit a control zone above a cloud layer, if he has appropriate cloud clearance and flight visibility, regardless of the ceiling height over the airport.

Thank you for your observations.

**FAA GENERAL AVIATION NEWS** welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.

### • LORAN-C Approaches

*In reading the article on LORAN-C (Jan/Feb 86), I noticed the statement that the FAA does not provide a graphic presentation or chart of the LORAN approach and that it must be ". . . obtained by the operator from an independent source, such as Jeppesen."*

*I can draw several conclusions from this statement. National Ocean Service does not publish, and will not publish, LORAN approach chart? Can you clear up the confusion by explaining the current, and expected future, status of LORAN charts?*

*Thanks for the quality magazine. I do appreciate it.*

*Gerard Stockhouse*
*Watertown, MA*

National Ocean Service produces instrument approach charts for public use. Special use approach charts are made by commercial charting companies. Both types are based on FAA approved procedures and data.

Loran-C approaches are at present limited to special use approval. When Loran-C approaches are approved for public use you may expect to see Loran-C approach charts in your NOS approach plate booklets.

Thank you for your interest, and for your appreciative remarks.

### • Special VFR in Transit?

*If I am transitting a control zone while operating under VFR, as in Situation II of your article on CZ's in the Jan/Feb issue, and I determine that the flight visibility in the area where I intend on operating is less than that required for VFR operations, can I obtain a Special VFR clearance even if the primary airport is reporting VFR conditions?*

*Corey J. Ferguson*
*Mission Viejo, CA*

If you determine that the flight visibility in the control zone ahead will be marginal or less than required for VFR operations, you may request a Special VFR clearance, even when the primary airport is reporting VMC. However, if this would interfere with the existing flow of IFR traffic in the zone, you can expect a delay, or possibly a denial. Maintain VFR conditions until a clearance is received. If a clearance is denied, select another route of flight.

### • Moving Cities

*Reference the November/December 1985 issue, article "Unmanned Aerospace Vehicles." Where's Monroeville, LA?*

*Francis Drake*
*Montgomery, AL*

Monroeville, AL, where the East Coast military training route for unmanned aerospace vehicles terminates, was accidentally transposed to the abbreviation for Louisiana. Thank you for calling it to our attention.

### • LOCID Error?

*In your November/December issue on page 4 at the bottom lefthand corner, you give an example for translating the LOCID 4LJ in the new IVRS as 045654. I think this is an error. Shouldn't the translation be 045556?*

*Walter B. Nelson*
*Greenwich, CT*

The example in the magazine is correct. The second keystroke for each letter indicates the letter's position on the key not in the LOCID.

### • Mode C Is Not On With "ON"

*I wish to direct your attention to a somewhat misleading statement about a rule change to FAR 91.24, in the January-February 1986 issue of FAA GENERAL AVIATION NEWS. The news article entitled, "Transponders Must Be 'On' in Controlled Airspace," implies that transponders must be turned to the "on" position while in controlled airspace. Most general aviation transponders that I have used display "off", "standby", "on" and "alt" (altitude) positions. The "on" position does not provide Mode C altitude information. The "alt" position transmits that information to air traffic control.*

*The rule change to FAR 91.24 specifies that "each person operating an aircraft equipped with an operable ATC transponder shall operate the transponder, including Mode C equipment if installed." Turning a transponder to "on" is sufficient for non-Mode C equipped aircraft; however, I submit that most transponders in use today have Mode C capability.*

*I enjoy reading your most informative magazine and appreciate the opportunity to comment on this point.*

*Charles A. Winkenwerder*
*Des Moines, IA*

Your point is very well taken. A Mode C equipped transponder should be on "alt" in controlled airspace, and wherever else you need to transmit your altitude.

## INSTRUMENT CORNER

### • Below Minimums Approach

***Is it legal for Part 91 aircraft to commence an instrument approach even if the report ceiling is below DH or MDA and the visibility is below published minimums? If the approach can be commenced, is it legal to land if the flight visibility, as determined by the pilot, allows identification of visual references as per §91.116? Also, when "flight visibility" is mentioned in §91.116, does it refer to visibility from the cockpit?***

***John Manera***
***Rockport, MA***

**A pilot operating under FAR Part 91 may commence an instrument approach regardless of the reported ceiling and visibility. Descent below the MDA/DH and landing can be completed as long as the following three conditions prevail:**

**(1) "The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent, using normal maneuvers. . ."**

**(2) "The flight visibility is not less than the visibility described in the standard instrument procedure being used."**

**(3) Except for a Cat II or III approach . . . at least *one* of the following visible references for the intended runway is distinctly visible and identifiable to the pilot: threshold, threshold markings, threshold lights, runway end identifier lights, visual approach slope indicator, touchdown zone or touchdown zone markings or lights, runway or runway markings, or the runway lights.**

**Flight visibility, as used in FAR §91.116 and defined in FAR Part 1, ". . .means the average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night."**

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(continued from page 9)

**Coordination with FAA.** At least 90 days before a new airport lighting system is commissioned, or changes are made in its operation, the pertinent data should be sent to the nearest FSS or directly to the FAA National Flight Data Center, ATO-250, Washington, DC 20591. The information will be made available to pilots as NOTAMs and published in Airport/Facility Directories and charts.

**Approach Lighting.** Approach lights are a series of lights, or banks of lights, extending outward from the runway threshold along the extended runway centerline. Their purpose is to assist pilots in making instrument approaches at night, and to permit somewhat lower weather minimums for instrument approaches. For the non-precision approaches used at unattended airports, the approach lights will be some array of medium intensity lights.

The more extensive of these systems has about 50 lights displayed along the approach course. These will usually consist of up to seven rows, or bars, of steady burning lights, with a triple bank of lights indicating 1,000 feet to the threshold. Sequenced flashing lights may extend to a point as far as 2,400 feet from the threshold.

In most of these systems the lights are visible from the air only within a limited azimuth range—essentially useful to aircraft that are already aligned with the runway. One exception is the system known as ODALS (omni directional approach lighting system). ODALS consist of only seven strobe lights, one at either side of the threshold and five others extending outward 1,500 feet and flashing in sequence toward the runway. The amount of illumination is not great, but these lights are visible from all directions to aircraft flying at from 2° to 10° above the horizon. They can be very helpful in some circumstances. ODALS is favored by some airport managers because of the relatively low cost of installation, operation, and maintenance.

Approach lights, as well as runway lights, may be radio activated and used by pilots landing under VFR conditions. It pays to become familiar with them. If you have had any experience with maintenance charges resulting from hard landings in the dark or semi-dark, you will appreciate the value of using current charts and other publications to ascertain what kind of airport lighting is available in the area of your destination airport—and checking NOTAMs for outages or changes in lighting operations.

In an emergency, just keying the microphone rapidly seven times on the UNICOM or tower frequency might light up the darkness. But why leave it to chance?

For further details consult the recently updated (1986) FAA Advisory Circular 150/5340-27A available from the DOT Distribution Section, M 494.3, Washington, DC 20590. ■

*Long wet grass...*
*slippery as glass*

25/3

FAA
# general aviation NEWS

May—June 1986

A DOT / FAA FLIGHT STANDARDS SAFETY PUBLICATION

*The Slashed Blue Circles — Safer Air With Minimum Control, p. 4*

*Also in this issue:*

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*Eyes Right — and Left!, p. 10 • Missed Approach Altitudes, p. 11 •*
*Absent Cues, p. 12 • Flight of the Pterodactyl, p. 13*

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# FAA GENERAL AVIATION NEWS

**MAY/JUNE 1986**
**Volume 25, Number 3**

Elizabeth Hanford Dole, *Secretary of Transportation*
Donald D. Engen, *Administrator, FAA*
Anthony J. Broderick, *Assoc. Admin., Aviation Standards*
John S. Kern, *Director, Flight Standards*
Carol S. Rayburn, *Manager, General Aviation and Commercial Division*
Gary D. Koch, Sr., *Manager, Accident Prevention Program Branch*
David Gelfan, *Editor;* Louise Oertly, Associate Editor

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# BRIEFS

STATIC TORCH. Paper toweling is not recommended for mopping up gasoline spills or removing residue fuel. Such towels can discharge an electrostatic spark when torn or rubbed hard. Rubber sponges or cotton towels are much safer.

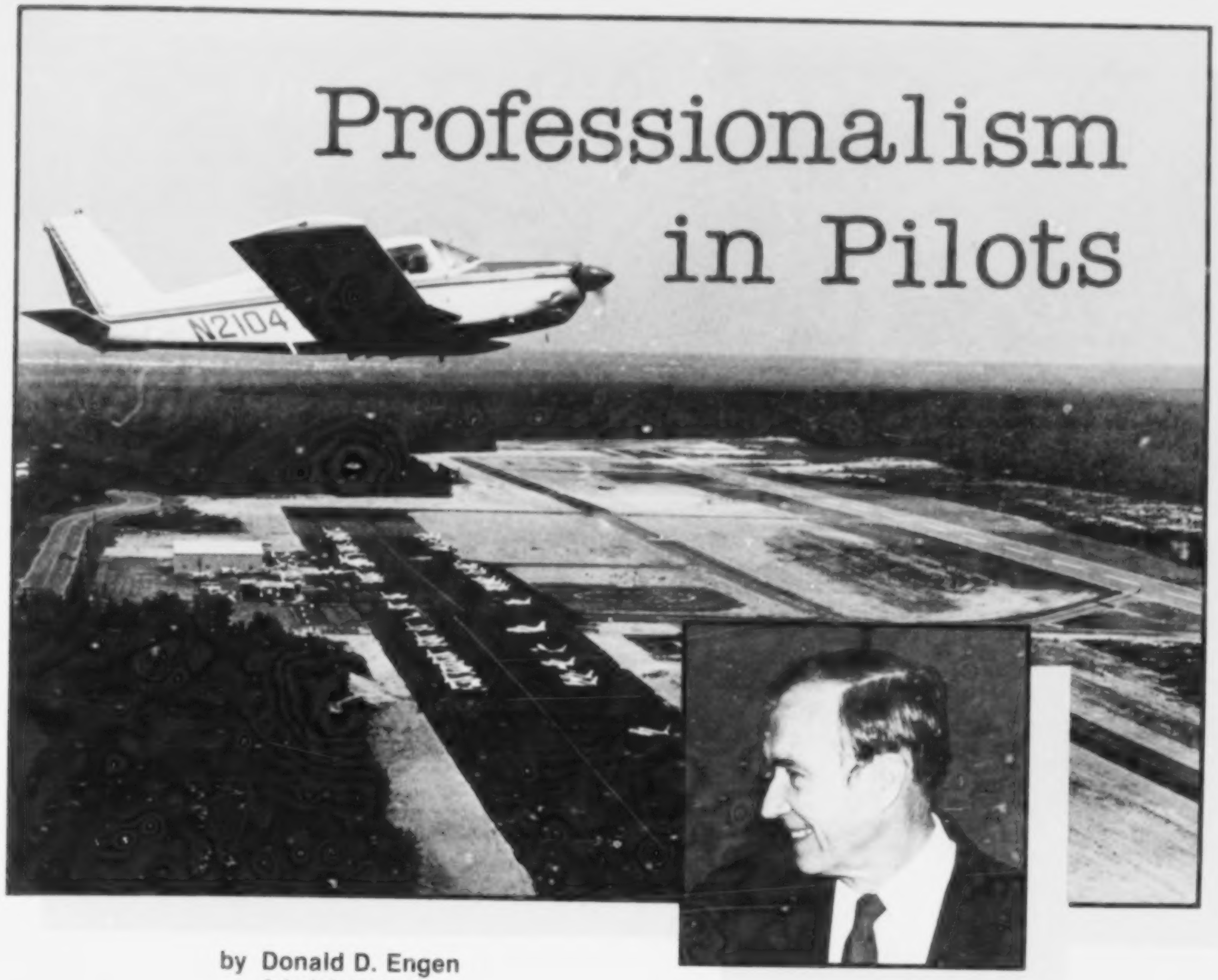
SPAR DECAY. Operators of aircraft with wooden spars or other structural members are advised to have the aircraft inspected periodically for indications of damp, rot, or mildew. The potential lifespan for wooden structures is virtually unlimited, but only if they are fully sealed against contact with moisture--including humid air. Wooden aircraft which winter outdoors, particularly in the southeastern states, are most vulnerable to mildew decay, which can progress unseen unless the interior of the wing is examined by a qualified person.

POT-SMOKING PILOTS, who assume that they are safe as long as they do not indulge in the drug on days when they are flying, are deceiving themselves. A recent simulator study at Stanford University demonstrated that a deficiency in flying skills persists at least 24 hours after "social" indulgence in marijuana, and perhaps much longer. Urine tests for marijuana may be positive 72 hours after usage. Users may be completely unaware of significant residual effects. FAA recommends complete abstinence from all illicit drugs for all pilots.

NATIONAL AWARDS. Now is the time to nominate your favorite flight instructor and/or aircraft mechanic for the 1986 Flight Instructor and Maintenance Technician of the Year Awards. Contact your local Accident Prevention Specialist for details and submit your nominations by June 30, 1986.

CUB HAVEN. Devotees of "rag wing" Pipers will gather July 13 to 19 at Lock Haven, PA, where the first Piper Cub was rolled out of the hangar nearly 50 years ago. The Fly-In will provide seminars on the safe maintenance and operation of fabric-covered aircraft. Contact the "Sentimental Journey to Cub Haven" organization, Box J-3, Lock Haven, PA 17745 (telephone: 717-893-4200).

# Professionalism in Pilots



**by Donald D. Engen**
Administrator
Federal Aviation Administration

Effective accident investigation has been the key to a great deal of aviation progress ever since Orville Wright reassembled the airplane, following the first fatal airplane accident in the United States. The lessons learned from sometimes tough experiences have enabled progress in engineering, aircraft design and development, and operational procedures that improve aviation safety.

As much as we learn from accident investigation, however, our primary emphasis must remain on accident *prevention*. The "Back-to-Basics" program that I initiated at the FAA last year seeks to reinforce the simplest and most straight-forward elements of aviation safety. The most basic element in aviation safety, as in all progress, is a sound and professional approach to the work at hand by pilots at every level.

True professionalism is a product of one's attitude and approach to the tasks at hand. The true professional is never satisfied merely with the performance of satisfactory work. The goal is always to excel. As a test pilot, I was privileged to fly higher, farther, and faster than other pilots had done, enjoy myself while I was in the air, and return to provide vital information for continued improvement. Each time I began preflight procedures, I set high standards for myself, and expected corresponding standards on the part of others working with me. That attitude in pursuit of excellence stays with the entire team from pre-flight through take-off and departure procedures to the landing at the end of the flight.

I have seen that same professionalism in the best pilots around the world. Consistency in this professional conduct can and should be applied to every aircraft, from sailplanes ridge soaring over coastal cliffs to 747's flying from St. Louis to Paris.

When we talk about "human factors" in aviation accident investigations, we are commonly considering the factors that diverted the pilot's attention from immediate professional responsibilities. When our minds wander from these direct responsibilities, we begin to witness the deterioration of that professionalism so vital for aviation safety.

The "Back-to-Basics" program is examining factors that affect flight safety. The program addressed landings in its first months, and is now focused on collision avoidance. As the program moves through other themes, it will help all pilots to remember that professionalism is the key to overcoming all obstacles to safety. We begin with the proper attitude, sustain efforts toward excellence throughout each flight, and strive for the highest possible human performance at all times. That is not only the key to achievement in aviation, it is the mark of the professional in every field. ■

*Administrator Engen is a former Navy engineering test pilot and combat pilot in World War II. He was awarded 29 combat decorations, including the Navy Cross for his part in sinking a Japanese aircraft carrier. He served with the National Transportation Safety Board before coming to FAA.*

# The Slashed Blue Circles

As of May 8, FAA has commissioned 54 Airport Radar Service Areas (ARSA's) in the United States, ushering in a new program for handling dense mixtures of VFR and IFR traffic at moderately busy airports. Much less restrictive than the TCA's and utilizing considerably less airspace than the TRSA's they are replacing, ARSA's hopefully will succeed in reducing the potential for mid-air collisions in busy terminal areas while maintaining free access to major airports for all traffic.

ARSA's are able to do this because they combine the controllability of regulated airspace with a flexible attitude toward the various needs and capabilities of VFR traffic. No particular pilot certification is needed and all types of aircraft have access to the airspace. Parachutists and ultralight operators must obtain prior authorization in order to avoid possible delays. The only operating requirement is that two-way radio communications with air traffic control be established and maintained. Traffic permitting, even this requirement may be waived if suitable non-radio procedural arrangements can be worked out in advance.

The configuration of ARSA's is quite simple: as shown on sectional charts it is the airspace enclosed by two concentric blue circles, extending outward from the primary or central airport for a distance of approximately ten nautical miles.

Some irregularity in the circular design may occur to accommodate underlying small airports or unusual terrain. The ARSA ceiling is approximately 4,000′ AGL. The floor is at the surface within the inner circle and at approximately 1,200 AGL within the outer circle. Note that the precise altitudes for individual ARSA's, as displayed on the sectional charts, is in terms of MSL—i.e., 50/13 printed in the outer circle means that the ARSA ceiling is at 5,000′ MSL and the floor of the outer circle is at 1,300′ MSL.

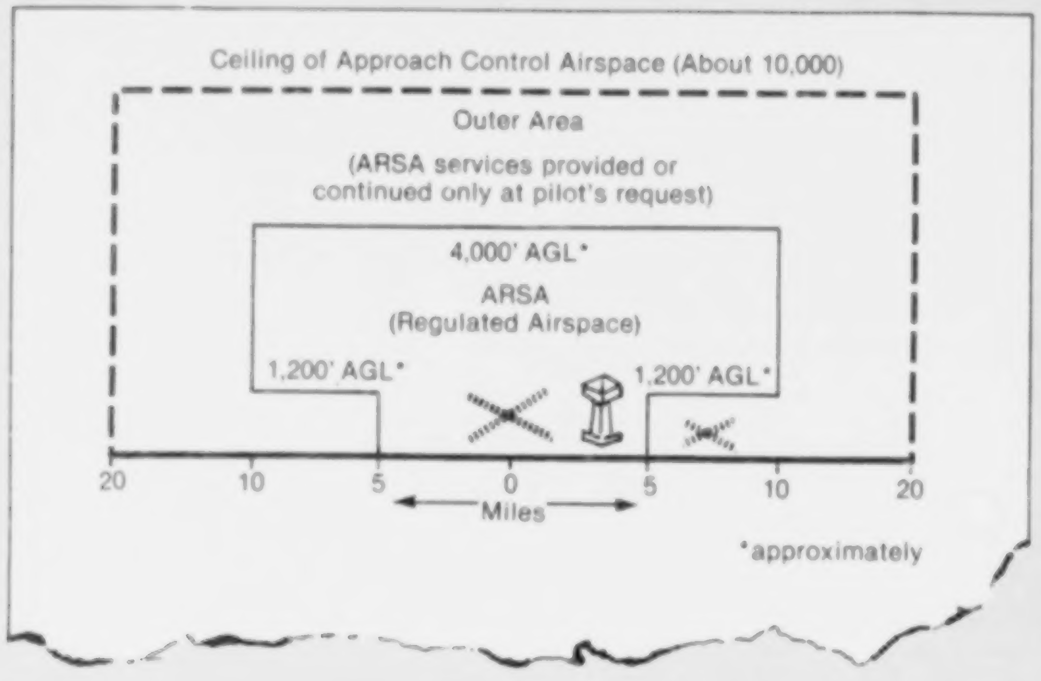
Some pilots regard ARSA's as merely another chunk of "free" airspace that has been swallowed up by regulatory encroachment, resulting in delays, diversions, and controller harassment of VFR pilots. Actually the opposite is true. Radar identification and/or surveillance of all traffic in a busy terminal area reduces the need for ATC vectoring and radio transmissions. A denser, faster flow of traffic is possible, with closer horizontal separation and a greatly reduced likelihood for unresolved conflicts.

Although arriving aircraft must contact approach control before entering an ARSA, no complicated clearance is involved. The aircraft is radar identified and the pilot's intentions are disclosed; if there is no conflicting traffic he or she is able to complete the flight as planned. At the appropriate time, aircraft landing at the primary airport will be sequenced for landing and turned over to local control. Aircraft landing at uncontrolled airports within the ARSA will conform to FAA traffic patterns, in compliance with FAR 91.88 (effective as of March 14, 1985).

Identification is accomplished most easily by squawking a discrete transponder code. Pilots of aircraft which are not transponder equipped can simplify the identification process by calling in when over one of the established checkpoints or reporting points (shown on sectional charts by a magenta flag). The discrete approach control frequency for arriving aircraft at various sectors is shown in a rectangular box. For example, when approaching Winston-Salem-Greensboro ARSA from the west you might call, "Greensboro Approach, Cessna 135 Victor, at 4,500 over Sugar Valley Airport." When more convenient, prominent landmarks or airway fixes may also be used as reporting points.

When transponders or reporting points are not used, the pilot may be directed by ATC to execute one or more identifying turns, for purposes of radar identification.

Additionally, if there is conflicting traffic on entering the ARSA, the pilot may be given whatever vectors are required to enter the flow of traffic in the most direct manner possible. You can speed up the process by listening to the ATIS (automated terminal in-


Ceiling of Approach Control Airspace (About 10,000)
Outer Area
(ARSA services provided or continued only at pilot's request)
4,000' AGL*
ARSA
(Regulated Airspace)
1,200' AGL*
1,200' AGL*
20
10
5
0
5
10
20
Miles
*approximately

formation service) before you contact ATC. ATIS will give you current information on weather conditions, traffic, and runways in use. It also helps to listen to the approach control frequency briefly before you key the microphone—not just to avoid interrupting transmissions, but also to clue yourself in on the overall traffic picture.

Keep in mind always that possible conflicts between VFR aircraft are handled by means of traffic *advisories*—not traffic *separation*. Separation means constant vectoring to maintain a given distance between aircraft. Traffic advisories means information such as bearing, altitude and approximate distance to another aircraft with which you may be in conflict. You are expected to locate the conflicting traffic and alter your flightpath as required. (Advise approach control when you do so.)

In emergency circumstances, if a conflict seems imminent, the controller will issue a *safety alert*. This is a recommendation to change course immediately, in order to avoid another aircraft or a ground obstacle. Safety alerts are issued only after pilots have failed to heed, or respond effectively to, previous radar advisories.

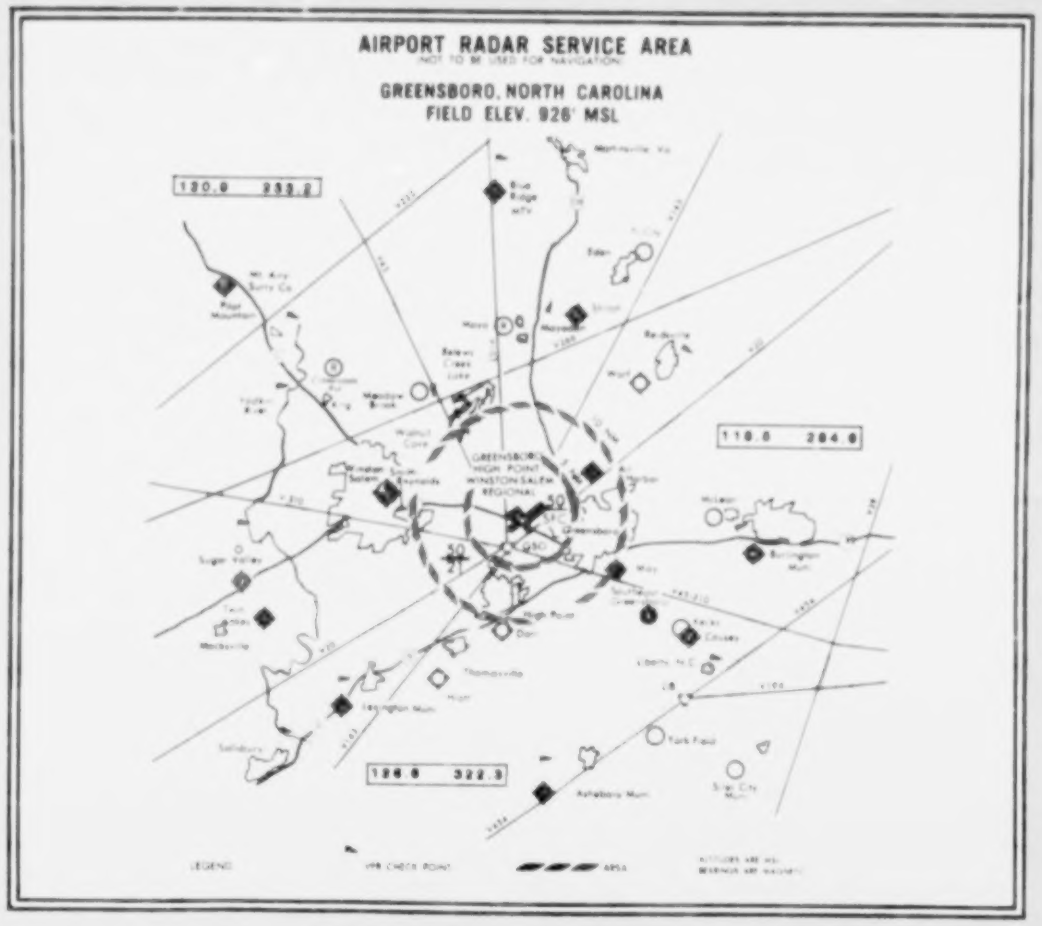
The airspace that extends for about ten nautical miles beyond the ARSA perimeter and rises up to the ceiling of approach control airspace (approximately 10,000′ AGL) is known as the Outer Area. This is *not* regulated airspace and it is not shown on any charts. This is the area in which arriving pilots make their initial contact with approach control. Full ARSA radar services will be provided to pilots who contact approach control in this area, unless the pilot declines the service (by requesting to leave the frequency).

Some pilots are reluctant to accept ARSA service until they actually enter the ARSA because they worry about being diverted off course or delayed by vectors. However, the sooner ATC knows *who* you are and *what you want to do*, the sooner they can assist you in reaching your destination. Accepting the service in the Outer Area also means earlier radar protection from traffic conflicts and less chance of your being held up for traffic adjustment at the ARSA perimeter.

Departing from the primary airport in an ARSA is also relatively simple. If the airport has an ATIS, it will give you the information needed by clearance delivery or ground control on initial contact. Usually this will be your type of aircraft, transponder equipped or not, direction of flight, and cruising altitude. You will be assigned a transponder code (if you have a transponder) and a departure frequency. You will be switched to departure control as soon as you are handed off by the local controller.

If you are departing from a satellite airport within the inner circle of the ARSA, obtain the frequency for departure control before you take off and initiate radio contact as soon as possible after you become airborne. If your route of flight will take you close to the primary airport, you are advised to alter your course, as necessary, to avoid this airspace until you have contacted departure control. You should be aware of and comply with departure traffic patterns for your airport, as published in the FAA Airport/Facility Directory.

Remember that ARSA services will not terminate automatically when you leave the perimeter of the regulated airspace. In the Outer Area you have to inform ATC when you wish to "leave the frequency." In busy conditions many pilots prefer to remain under radar surveillance until they are a full 20 miles from the center of the ARSA. Once you leave or change the frequency you will no longer receive traffic advisories or safety alerts.



## ARSA SQUAWK LIST

Some of the frequently heard complaints about operating in an ARSA, and what to do about them.

1. **No Entry** *"I called in early and gave them all the dope they wanted to know and then they held me outside the ARSA. What do I need, some kind of magic password? I'd be better off making my call after I'd barged in."*

At any given busy terminal a traffic situation may occasionally develop that results in aircraft being delayed briefly before continuing toward their runway. In this kind of situation, the earlier you announce yourself, the better chance you have of avoiding detours or delays.

2. **Identifying Turns.** *"What really bugs me is having to make a bunch of identifying turns for the sake of radar contact. This is a big waste of time as far as I am concerned. There is nothing in the rule about needing a transponder, or having to make radar contact. Why isn't it enough for me to give them altitude and heading?"*

Radar identification is almost always necessary in order to fit you into a close flow of traffic safely, to issue traffic advisories, and provide separation from IFR aircraft. However, in some situations it may not be necessary. If, for example, you operate an aircraft that does not show up well on radar, the local facility can develop procedures to provide you service even though they cannot see you.

3. **Vectoritis.** *"A lot of times I've been vectored away from my course in an ARSA when I could see no other traffic for miles. Sounds like a bad case of "vectoritis" to me."*

There is usually a good reason for vectoring. For example, it may be that a high performance aircraft were taking off in an opposing direction and climbing out in a nose-high configuration, so that it would be difficult for the pilots to observe you. That would place the whole burden of conflict avoidance on your shoulders, unless you were moved.

Bear in mind that the longer an aircraft remains airborne in the ARSA, the heavier the controller's load. He wants to get you to your destination just as fast as you want to get there—but safely.

4. **Traffic Tantrums.** *"Sometimes it seems to me that I am getting traffic advisories about aircraft that either don't exist or are being pushed up ahead of me on some kind of special priority. I thought the ARSA was supposed to eliminate favoritism in maneuvering."*

ARSA is as new to controllers as it is to pilots, so naturally there has to be a period of adjustment before everyone can work together smoothly. The controllers are transitioning from a mode of providing traffic separation to one of conflict resolution. Pilots are learning how to provide their own separation in a busy terminal area, with the aid of radar advisories. The time required for this adjustment period varies from controller to controller and from pilot to pilot, and allowances must be made during this time. Some vectors or advisories may be issued in an ARSA when they may not be necessary. Some pilots may be slow to initiate action to avoid conflicts at first because they expect vectors. As everyone becomes more familiar and experienced with ARSA's, the bugs should all be worked out. The end result will be better safety and better service. Who could ask for anything more?

In the meantime, if an incident occurs which really troubles you, you should contact the ATC facility manager without delay. If it is done within a matter of days—or hours, better still—everyone involved will have a reasonably clear recollection of what actually happened, and how the problem may be dealt with. It is worth the time and effort, if you care about flying. Two-way, honest, objective feedback is the only way significant improvements to the system can be realized. The agency conducts various kinds of evaluations and quality assurance studies of air traffic programs, but without pilot input on specifics it is hard to know what is really going on.

5. **Out of Place.** *"You say that even student pilots are welcome in an ARSA. Well, I'm not a student but I'm not a high timer either and I get worried sometimes when I get delayed and my fuel needle starts dropping off, or when I can't copy the controller's instructions fast enough. I feel out of place."*

Speak up! The controller may be under some pressure, but if you have fuel problems or difficulty understanding instructions, don't fret about it, let someone know—in plain English: "I'm running low on fuel!" "Speak slower please, I can't follow you!" Out of fairness to the other pilots you should prepare yourself to operate in the ARSA as well as possible, but once you're up there in the blue circles remember what they are put there for. Service! ■

*Editor's Note: This article was based in part on material provided by Michael M. Sarli, Manager, Baltimore Air Traffic Control Tower.*

### ARSA OPERATING RULES AND PILOT/EQUIPMENT REQUIREMENTS

1. **Pilot Certification:** Student Pilot or better.
2. **Equipment:** Two-way radio.
3. **Arrivals and Overflights:** No persons may operate an aircraft in an airport radar service area unless two-way radio communication is established with ATC prior to entering that ARSA and is thereafter maintained.
4. **Departures:**
   a. Primary airport: No person may operate an aircraft within the ARSA unless two-way radio communication is maintained with ATC while within that ARSA.
   b. Satellite airports: Aircraft departing satellite airports/heliports within the ARSA surface area shall establish two-way communication with ATC as soon as possible. Pilots must comply with approved FAA traffic patterns when departing these airports.
5. **Ultralight Vehicles:** No person may operate an ultralight vehicle within an airport radar service area unless that person has prior authorization from the air traffic control facility having jurisdiction over that airspace. (FAR 103)
6. **Parachute Jumps:** No person may make a parachute jump and no pilot in command may allow a parachute jump to be made from that aircraft in or into an airport radar service area without or in violation of the terms of an ATC authorization. (FAR 105)
7. **Hot Air Balloons:** No person may operate a hot air balloon within an airport radar service area unless that person has prior authorization from the air traffic control facility having jurisdiction over that airspace. (FAR 91)

### ATC Services

1. **Within the ARSA:**
   a. Sequencing of all aircraft arriving at the primary/ARSA airport.
   b. Standard IFR separation between IFR aircraft.
   c. Between IFR and VFR aircraft—traffic advisories and conflict resolution so that radar targets do not touch, or have less than 500 feet vertical separation.
   d. Between VFR aircraft—traffic advisories and, as appropriate, safety alerts.
2. **Within the Outer Area:**
   a. The same services are provided for aircraft operating within the outer area as within the ARSA, *when two-way communications and radar contact (when necessary) are established.*
   b. While pilot participation in this area is strongly encouraged, it is not a VFR requirement.

# DOCKSIDE MANNERS

## Tying Down A Float Plane In Fair And Foul Weather

You have just about completed a nearly perfect afternoon flight in your float-equipped airplane, with two business friends on board who were enjoying their first experience in flying over water. You cut the engine and step jauntily out on the float, bow line in hand, ready to make fast to the piling at the dock as the airplane's momentum carries you shoreward. But to your surprise a sudden offshore gust starts pushing you away from the dock. What to do? Take a flying leap toward the dock, and risk the humiliation of a public dousing? Unship the paddle and try to out-muscle the wind. Slip back in the cockpit and hope you can get a quick restart before you drift against a mooring?

There are times, at the conclusion of a flight, when handling a floatplane calls for a good bit of seamanship. A waterborne airplane behaves pretty much like a boat and is subject to many of the same natural phenomena that affect any other waterborne vessel. The time to practice your seamanship skills is in calm weather, in the company of experienced companions.

Moving out from a dock or mooring does not present as many problems as returning, since you are usually not about to undertake a flight in a floatplane if the wind is strong or the water choppy, except for compelling reasons. But adverse weather conditions can spring up around your water airport while you are out flying, or be waiting for you at your destination in some remote wilderness area.

The first important decision you have to make, as you taxi toward your intended dock or mooring, is *when* to cut the engine. You don't want to dent the floats, but you don't want to swim for shore with a rope in your teeth either. Experienced seaplane pilots scan the water carefully for signs of adverse current or wind, and try to switch off at a point that allows the floats to just gently "kiss" the (hopefully padded) dock. While many pilots stop the engine with the ignition switch rather than with the mixture control, in order to make a quick restart possible, if needed, FAA does not recommend this procedure, due to the possibility of engine backfire or other damage upon restart. Following the manufacturer's recommendations is the safest policy. Selecting the appropriate engine cutoff point can be demanding if there is any appreciable wind, especially from the tail or from the side or a strong current. A deceptively smooth surface can mask a rapidly moving body of water, in a stream or tidal basin.

If something goes awry and your forward motion stops short of your intended tie-up, a paddle may help. Most seaplanes are equipped with a paddle. However, not all seaplane pilots realize the limitations of this tool. For an aircraft, a paddle is strictly a *calm weather, still-water implement.* A seaplane pilot has trouble making headway with a paddle against any wind of five knots or more, or any current or tidal flow of similar velocity.

Furthermore, directional control may be just about hopeless. Even in the quietest of conditions it is difficult, since you will be paddling from well to one side of the aircraft. A waterborne vessel weighing in the neighborhood of 2,500 to 3,000 lbs. is no canoe—it is just not easy to push around with a paddle. And with most of the structure well above the waterline, the effect of wind pressure, as compared with paddle pressure, may prove to be too much to handle.

A supplementary tool that could extend your reach shoreward by at least half a dozen feet would be a boathook. There are some very lightweight aluminum models available now that telescope into a short length that is easily stowable inside the airplane. A fixed length boathook could be clamped to the float struts with an appropriate easy-release fastening.

If you do a lot of close maneuvering in shallow water, in the presence of sandbars, boulders or reefs, your best tool might be a sized down version of the time-honored barge pole. You can put almost your whole body weight on a pole and use it to push your airplane in any direction. It is also useful for prying jammed floats off underwater obstructions, and for testing the depth of the water immediately ahead.

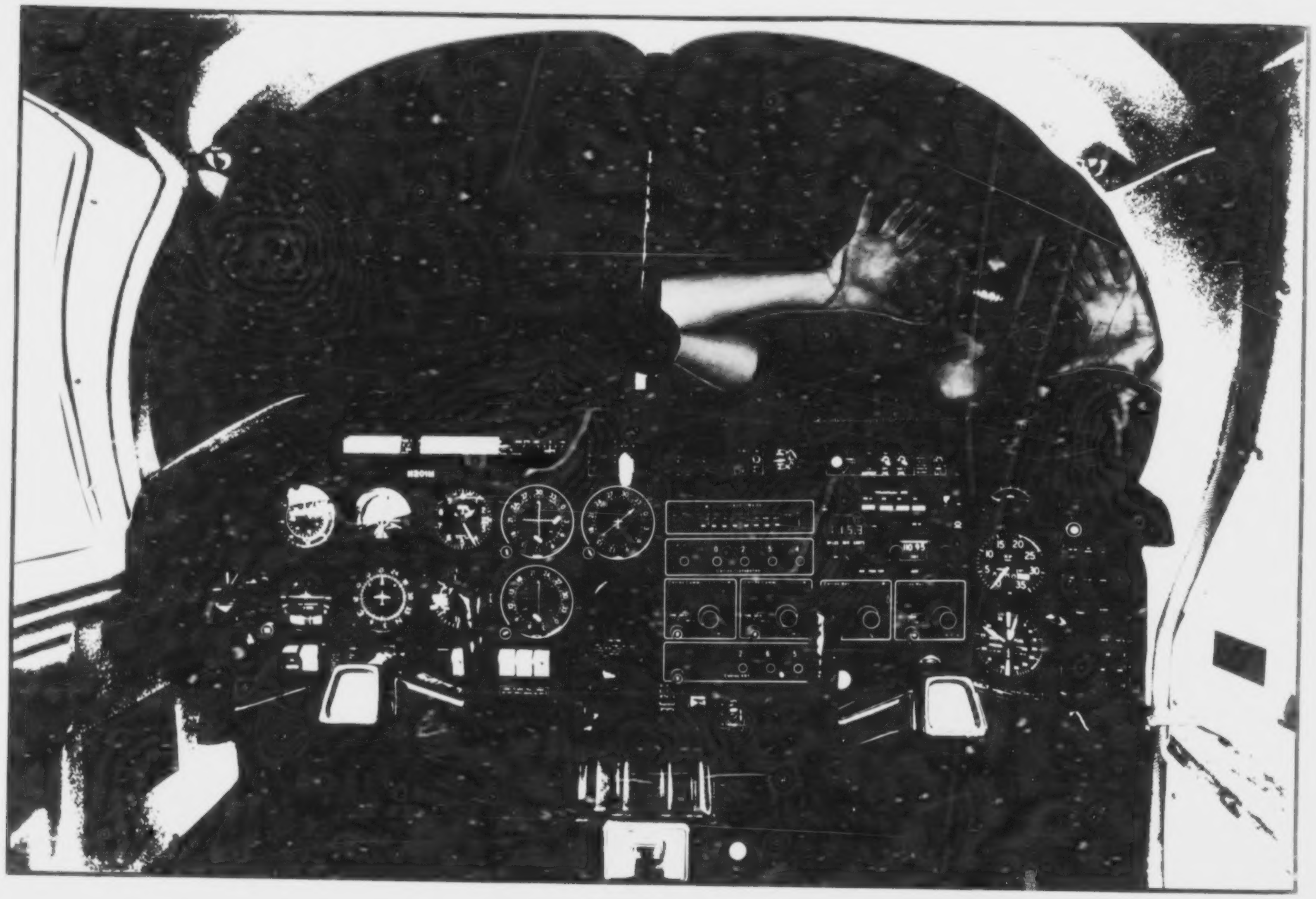
To avoid getting the pole jammed into rock crevices or stuck in a muddy bottom you might want to have a metal plate fitted to one end. Like the boathook, the pole also can be made of lightweight aluminum and may telescope or fold to a stowable length. In an emergency, poles may be cut from saplings or bamboo clumps on the shore.

If you intend to carry such tools outside the fuselage, you will need FAA-approved devices to secure them. See your nearest Flight Standards District Office for guidance and approval. Proper stowage of equipment inside the aircraft is also important, as regards to both aircraft trim and passenger safety.

Some floatplane pilots like to carry an anchor as well. Not a heavy mass of lead but a grappling device of modest weight. Very useful when tie-down space is not available.

Last but certainly not least in the way of mooring equipment is a goodly quantity of rope, or "line," if you want to be salty about it. The wider your range of travel, the more rope you should carry—300 to 400 feet is not unusual for Alaskan bush flying. With enough rope on board you can operate independently of docks, mooring buoys or other trappings of civilization. In any case, extra rope gives you the option of rigging mooring lines in a manner best calculated to enable you to ride out a storm without float damage. Learn (or relearn) some knot tying techniques from seasoned boaters and you will soon be a fully prepared aeronautical person. ■

Editor's note: This article was based on information provided by Operations Inspector John Roseborough. Additional input from an article written by C. Marin Faure for "Water Flying" magazine, used with permission of the Editor, Mary Silitch.



# THEY DON'T ALL GET AWAY WITH IT

## Avionics are the prime target of aviation burglary rings

This is the city, San Jose, CA, Tuesday, September 17, 1985. I was working the sales desk at my company, Gordon Avionics. My partner, Russ, had gone home for the day. My name's Jerry. I'm not a cop.

**5:15 p.m.** The phone rings. A confident voice on the other end asks if I would be interested in purchasing some used avionics. His story is that he has a friend with a TV shop through which he was able to acquire a King Radio KNS-80 and a KT-76A. He hoped to make a little profit in so doing.

I told him I would certainly be interested, but it would have to be proven that the radios were not stolen. He then asked me how I could find that out. I told him of the International Aviation Theft Bureau and their listings. I offered to check the serial numbers right then if he wanted. He gave me the serial numbers, which turned out to be not on the list, so we began to bargain. He told me of another offer from a competitor of mine, so I matched it. He said he wanted cash. When I asked "why?" he had a very logical answer: After all, who would want to go into a bank and try to cash a 4 figure check. He didn't want the hassle.

I could understand that, but when I asked his last name he declined. He wanted the phone number of the Theft Bureau so he could check the numbers himself. Didn't know me and didn't want to get involved if it turned out the radios really were stolen. Said he was a pilot and wouldn't want to jeopardize his certificate. He would call the Theft Bureau in the morning and if the radios were OK he would call me and set up the purchase. Said he would give me a bill of sale and furnish identification at that time. Sounded somewhat reasonable, so I said OK.

Something bothered me about the whole thing as I went home and relaxed for the evening. It continued to bother me while I was trying to sleep. What if this was the old double switch-a-roo? For those of you who hav not heard of this, it's simply a matter of stealing a radio from one aircraft and replacing with a like model from a second aircraft. Th owner of the second aircraft reports the seri numbers of his missing radio, but it's nev found because it sets in the first aircraft. Th owner of this aircraft has nothing to repo since apparently he still has his radio.

Well, with the serial numbers I'd got, thought maybe I could track this whole thi down. If I could find the registered own and contact them, they could check the s ial numbers of the equipment in their aircr and see if they matched King Radio's re ords. They could tell me they had bought ne radios, or the aircraft were scrapped something, to explain why these two radi were floating about. Sounded like the thin to do, so I went to sleep.

**Wednesday, September 18, 7:30 a.m.** I called King Radio and asked for the warranty department. Told them of my suspicions and what I planned to do. They came up not only with the owner of the radios (both registered to the same aircraft), but also a phone number from the warranty application. Were eager to help and wished me good luck.

**7:50 a.m.** I tried calling the number. No answer. Either the owner had left for work or he was still sleeping.

**8:00 a.m.** My son Russ and the whole crew files in. Another day starts in the avionics world. A day of a lot of nervous waiting. After the job assignments and everyone is involved in their tasks, I fill Russ in on the radio gambit and ask him to take over and follow up with what he had.

**8:10 a.m.** Russ calls the number again that was furnished by King Radio. A man answers. Fixed Base Operation, location in northern California. Aircraft in question is on leaseback to them. FBO gives Russ work phone number of the owner.

**8:15 a.m.** Russ contacts the owner who is all ears. Owner confirms he has a KNS-80 and KY-76A installed in his aircraft. Following explanation of the double you-know-what the owner agrees to have the FBO immediately check the serial numbers of the radios and get back to Russ. Owner volunteers that a couple of years ago he had those same radios stolen and they had been replaced by the insurance company.

**8:30 a.m.** The Voice calls about the two radios for sale and is given to Russ. Voice starts talking about taking cash and perhaps a hand-held transceiver as payment for these radios. Says he has called the Aviation Theft Bureau and found that these numbers are not on their list. Ready to deal now. Russ stalls Voice with chatter about the benefits of one hand-held transceiver over another. Tension mounts. The Voice says he will call back at 1:00 p.m. and tell us when he can bring the radios over for the sale.

**9:30 a.m.** The (rightful) owner calls and asks if we have heard from the FBO yet. We have not. He says he will call them again.

**10:00 a.m.** The FBO calls. Guess what? No radios!

Russ calls the San Jose Police Department and explains the situation. Sergeant says to have FBO in northern California contact local Police Department with a complaint and have them in turn get in touch with him. Russ makes the necessary calls.

**12:30 p.m.** No word. Russ won't go to lunch. He might miss something.

**1:00 p.m.** The phone rings. It's the Voice. He will be here in an hour. Russ is Mister Cool says he will have the cash waiting when seller gets here.

**1:02 p.m.** Russ calls the San Jose Police sergeant and asks if he has heard from the PD from up North. He has. Russ said the suspect will be here in an hour. Sergeant said his men would be there in half an hour.

**1:30 p.m.** No one here yet.

**1:45 p.m.** Three undercover guys with shirts hanging outside their belts came to our shop. "OK troops," I tell my guys, "here's the scenario." Undercover number 1 is out at our intersection with his old car, hood up, apparently in some kind of difficulty. He has his little portable and talks to the other two in the shop, alerting them of approaching cars or people. "Ford pick-up parking in front, man getting out, pausing, looking around, nope, going into gift shop." "Man approaching on foot, red baseball cap, no, went on by." And so on.

My poor daughter, Pam, our secretary, sits by the door where suspect will enter. She is staring out the window, wondering if she will be caught in the line of fire, taken hostage, or what. Not too much work done by her that day. Russ is staring out of the window with Pam, wondering how big this Voice guy is. I am in my office with the two undercover guys making light conversation and listening to my pulse as it increases. May have set a new record.

**3:00 p.m.** The man doesn't show. Customers come in and out and are dealt with quickly. They are led to the shop area to talk and don't appear to suspect anything.

**3:30 p.m.** A white van pulls up out front. The man looks at our shop. He gets out. Scruffy looking. Looks around. Pam comes to office and makes sure undercover guys know there's a van out there. Scruffy man opens door of van. Removes box. Pam comes back in and lets undercovers know he is getting out a box. He approaches and enters. Man asks if this is Gordon Avionics. Pam nods, unable to speak. Man says, "I have a delivery from Radio Shack, sign here." Everybody relaxes.

**3:40 p.m.** Undercovers are told to stop stakeout at 4:00 p.m. I almost faint. "What happens if this guy comes and you aren't here? Please stay until we close at 5." They make a call downtown and get an OK. I breathe again.

**5:00 p.m.** Oh well, nice try. Let's close up and go home. Maybe next time. He must have gotten cold feet. My crew leaves. Russ gets in his car, I in mine. The three undercovers are standing outside my door talking. I start my engine. Judy from the gift shop next door comes running out shouting, "Wait, you have a customer!"

A man with a red baseball cap strolls up to the three undercovers and asks one of them if he is Russ. It appears that he had been in the gift shop for some time, either getting up enough nerve or deciding whether or not to go through with the deal.

Undercovers tuck their shirts in, exposing badges, guns and cuffs. Man becomes rather ashen. "San Jose Police, like to ask you a few questions." Just like on T.V.—the good guys win! *Sometimes*. Made us feel good, anyway. ■

**Aircraft burglaries are still on the increase, with 270 break-in thefts reported in 1985, compared with 267 the previous year. Avionics are a prime target for this kind of thievery, which appears to be the work of well-organized rings using sophisticated tricks, like the double steal described in the accompanying article. In some cases only key components of the radios are taken, with no sign of disturbance, so that pilots who are not in the habit of checking out their radios carefully on the ground before a flight are in danger of finding themselves without important navigation or communications equipment when in need. *Don't get caught short!***

**Stolen equipment should not only be reported to the local police—but also to the International Aviation Theft Bureau, an organization sponsored jointly by AOPA Air Safety Foundation and major aircraft insurance companies. In reporting thefts, provide the serial numbers of the missing equipment, as well as make and model information. The Bureau is located at 421 Aviation Way, Frederick, MD 21701; tel. 301 695-2022. The executive director, Robert Collins, will assist you in seeking to recover your property.**

Editor's note: The above was adapted from an article by Jerry Gordon and reprinted with permission from AVIONICS NEWS, a monthly publication of the Aircraft Electronics Association.

# Eyes Right and Left!

The most sophisticated equipment made, alone, cannot prevent pilots from being involved in a mid-air collision without assistance and effort from the pilots themselves. It is through the use of our eyes to see and be seen and see and avoid that we can give ourselves the best chance of not being involved in a mid-air collision. It has been estimated that 80% of our total information intake is through the eyes. Therefore, while in flight, the use of our eyes to help perform the many tasks involved in piloting an aircraft must include one most important function—to be the primary anti-collision device on board the aircraft.

Studies of previous mid-air collisions show a clear pattern of when, where, and who are involved. We average approximately 24 mid-air collisions per year in the United States resulting in loss of equipment, damage and destruction of both private and public property on the ground, and most important, the loss of human life both in the aircraft and on the ground. These all are losses that can be stopped. Although a mid-air collision can occur at any time, there is a collision season that runs from April through October. Two of the most intriguing facts about mid-airs are that they occur during daylight hours and in clear weather. This could be the time most pilots feel that they are *least* likely to be involved in a mid-air and allow themselves to become complacent. Don't let this happen to you!

Approximately 70% of all mid-air collisions occur below 3,000 feet above the ground and within five miles of an airport. We know this is normally where our highest concentration of air traffic is located; however, there are *four times* as many mid-air collisions below 1,000 feet than between 2,000 and 3,000. When we examine mid-air collisions in the traffic pattern, we see that two percent occur on the downwind leg of flight, 18% occur on the base leg, and an overwhelming majority, 80%, happen on the final approach to landing. Of the 70% of mid-air collisions which occur within five miles of an airport, about two thirds are at uncontrolled airports. These statistics clearly reveal where the potential for a mid-air collision is greatest.

Pilot experience seems a significant factor in mid-air collisions. While no pilot is immune from the possibility of a mid-air, approximately one half of all mid-air collisions involve pilots with less than 1,000 hours of flying experience. Pilots who have not mastered, or do not *practice* good scanning techniques and become easily distracted, are prime-candidates for a mid-air collision. When more experienced pilots transition to a different type of aircraft, they increase their potential of being involved in a collision, because of the higher likelihood of distractions.

There is an abundance of evidence that highlights our need to continue to work to reduce mid-air collisions both as individuals and as organizations. Among the techniques that we can utilize are foolproof scanning techniques. This is especially true around airports where traffic density is high and pilots find themselves preoccupied with other duties associated with takeoff and landing. When given a chance, avoid crowded airspace during enroute and instrument training, such as directly over a VOR or other navigational aids. Strobelights or rotating beacons should be used at all times, unless special situations dictate otherwise.

Studies show that high intensity strobe lights increase an aircraft's contrast by as much as ten times, both day and night. Use the aircraft transponder and Mode "C" capability at all times. Remember, it is required when operating in controlled airspace. Discover where the blind spots are located for the particular aircraft you are flying and make allowances for this in your scan pattern and technique. Use your aircraft radio to broadcast your position and intention at least 15 miles out from the airport. Use your eyes, as well as those of any passengers you may have on board, to look for other aircraft.

And finally, plan ahead and keep the cockpit neat and uncluttered. The less time you spend with your head down in the charts, the more time you have to scan for other aircraft.

Being aware is one of the key factors that can contribute to the prevention of mid-air collisions. Collision avoidance must remain foremost in the minds of all pilots and everyone who is part of the aviation community. FAA's Accident Prevention Program is promoting and encouraging collision avoidance awareness as a second phase in the "Back-to-Basics" program. Although the mid-air prevention campaign runs only April through June, this should be a priority for all of us throughout the year. We in FAA and in the Accident Prevention Program need and ask for your support and participation as members of the aviation community.

There is no regulation or rule that can replace the principle of "see and be seen and see and avoid" when flying. Let's use our eyes and encourage everyone else to do the same. It's the best anti-collision device we have. ■

# INSTRUMENT CORNER:

## Missed Approach Altitudes

*During a recent visit to the Houston Center I was told by a controller that during the difficult weather associated with hurricane "Juan" he observed several pilots in his sector climb considerably above the published missed approach procedure altitude, while executing the missed approach. The controller said the published missed approach altitude was a mandatory altitude and he was concerned about possible conflicts with traffic in hold at higher altitudes at the same fix.*

*During my instrument training I was taught that upon reaching a decision to miss the approach I should first establish a positive rate of climb, then clean up the aircraft, fly the missed approach and communicate with air traffic. I don't remember anything being said about not flying above the published altitude.*

*For example, on the current approach plate (U.S. South Central) for the Minden NDB approach to Runway 1, the missed approach procedure calls for a "Climbing right turn to 2,000 in MNE NDB holding pattern." According to the legend page, 2,000 shown in this manner, with no line above or below, would be a "recommended altitude," not a maximum altitude. Please note also that the same 2,000 is depicted as a "minimum altitude" on the approach profile and as a MSA on the approach plan! Hence the confusion.*

*In training, much emphasis is placed on mandatory, minimum and maximum altitudes, but relatively little is said about missed approach altitudes, other than what is stated on the chart. My personal interpretation of 2,000′* as a missed approach altitude would be to "get up to at least this high as promptly as possible." I have posed this question to several pilot friends, and they all agreed that under these circumstances they would probably consider an expeditious climb more important than precisely hitting and holding the missed approach altitude, particularly in the absence of a definite designation of that altitude as maximum, minimum or mandatory. But consider the following hypothetical situation:

**The pilot of a high performance airplane commences an actual missed approach at Minden (NDB R-1) from a minimum descent altitude of 920 feet. In his anxiety to out-climb any possible obstructions, to turn on course, clean up the airplane, communicate, and then consider his next options, the pilot very easily outclimbs 2,000′ in less than one minute, perhaps without noticing it, and keeps on climbing. If he has no Mode C encoder and doesn't report his altitudes promptly, ATC may not even realize that there is a possible conflict in the holding area. They could be holding traffic at 3,000′ at this fix.**

**What say you?**

Dale P. Jewett
Hutchinson, KA

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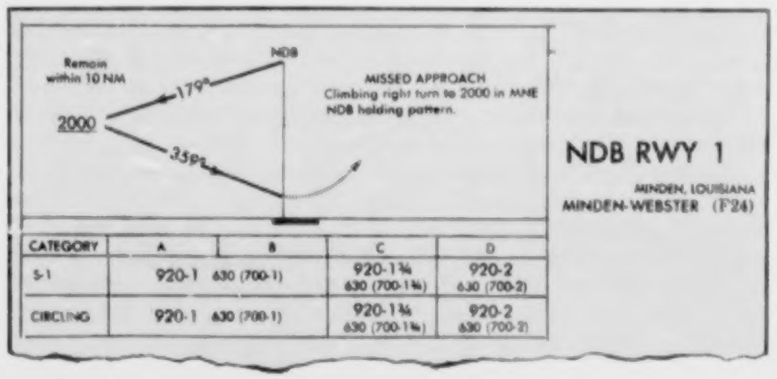
The altitude given for a missed approach is a *clearance* altitude. As such it is not a recommended, minimum, or maximum altitude, but a *mandatory* altitude which the pilot is to achieve promptly and maintain until otherwise notified by ATC.

On Government charts the basic instructions for executing a missed approach are given *textually*, not graphically. It is true that these instructions are located in the same box which contains the graphic profile of the approach, but the graphic symbology for the profile depiction does not apply to the missed approach text. Likewise, the symbols shown on the profile legend page, to indicate whether an altitude is *recommended, maximum, minimum*, etc., apply only to the profile *picture*, not the missed approach instructions, which happen to be printed nearby. The missed approach altitude is always an *assigned* altitude.

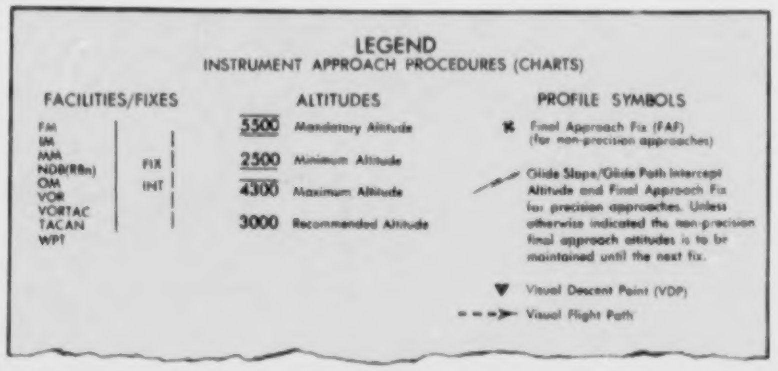


MISSED APPROACH
Climbing right turn to 2000 in MNE NDB holding pattern.

NDB RWY 1

MINDEN, LOUISIANA
MINDEN-WEBSTER (F24)

| CATEGORY | A | B | C | D |
|---|---|---|---|---|
| S-1 | 920-1 630 (700-1) | | 920-1¾<br>630 (700-1¾) | 920-2<br>630 (700-2) |
| CIRCLING | 920-1 630 (700-1) | | 920-1¾<br>630 (700-1¾) | 920-2<br>630 (700-2) |



LEGEND
INSTRUMENT APPROACH PROCEDURES (CHARTS)

FACILITIES/FIXES
FM
IM
MM
NDB(RBn)
OM
VOR
VORTAC
TACAN
WPT
FIX
INT

ALTITUDES
5500 Mandatory Altitude
2500 Minimum Altitude
4300 Maximum Altitude
3000 Recommended Altitude

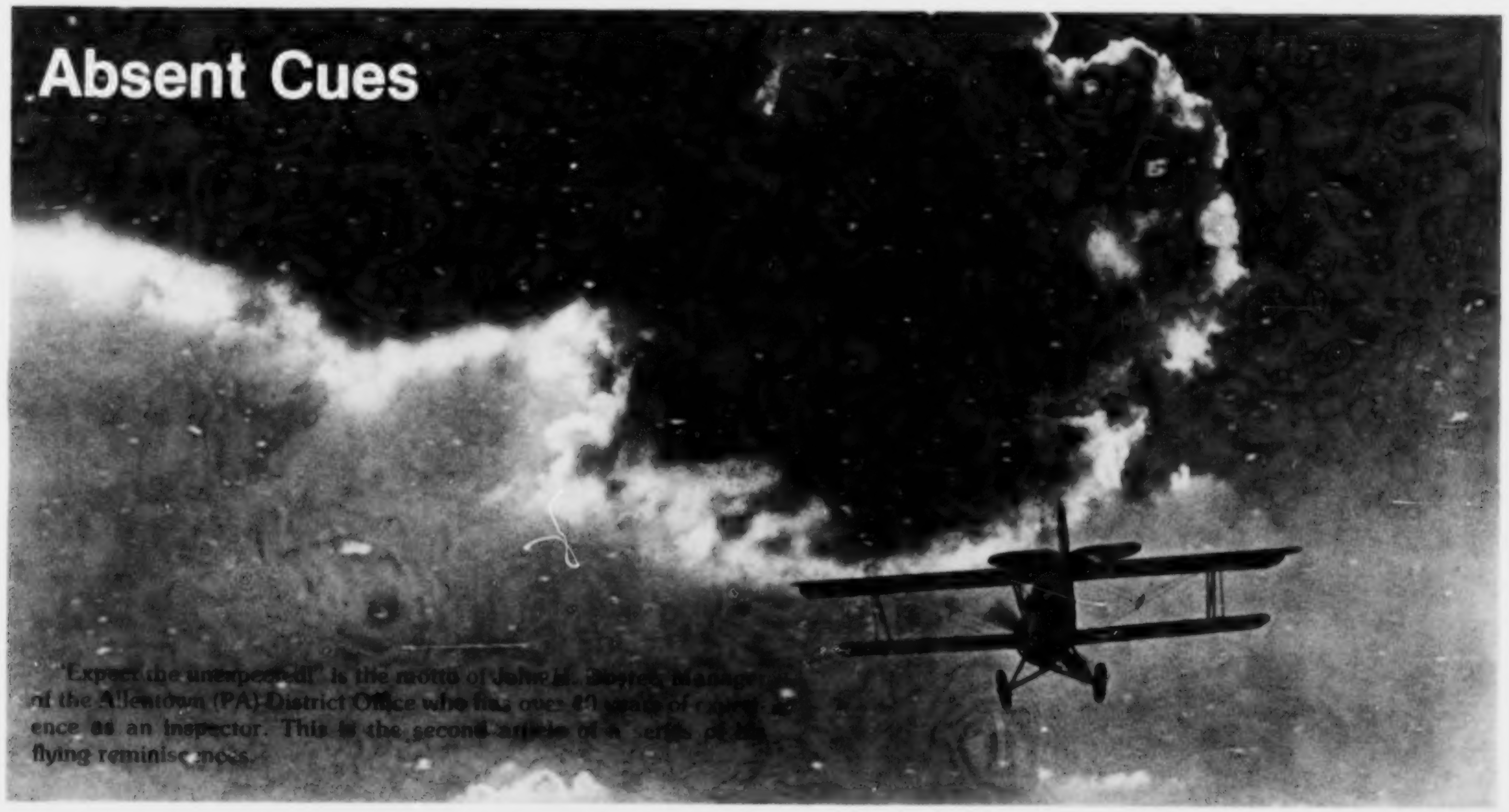
PROFILE SYMBOLS
Final Approach Fix (FAF) (for non-precision approaches)
Glide Slope/Glide Path Intercept Altitude and Final Approach Fix for precision approaches. Unless otherwise indicated the non-precision final approach altitudes is to be maintained until the next fix.
Visual Descent Point (VDP)
Visual Flight Path

The approach chart for Minden indicates you are to make a climbing right turn, enter the holding pattern at 2,000′, and remain there until otherwise advised. If you do not have an altitude encoding transponder you should inform the controlling facility as soon as you are established at the altitude and in the pattern. As you suggest, other traffic may be holding in the pattern at the next 1,000 foot level.

*Editor's note: In response to reader requests we will be expanding the Instrument Corner (normally included in the FORUM page) to a full page article, space permitting and when justified by the subject matter.*

# Expect the UNEXPECTED

## Absent Cues



"Expect the unexpected!" is the motto of John H. [illegible], Manager of the Allentown (PA) District Office who has over 40 years of experience as an inspector. This is the second article of a series of his flying reminiscences.

Aviation safety messages can be hidden by the buzz words and phrases in vogue today. "Management of cockpit resources" frequently appears but it seems to me that these words are more appropriate to the business world than to the cockpit of an airplane, be it large or small. We call the pilot in command "Captain" and expect him to act in that capacity, not as a chairman of a committee. A sea captain, at 30 knots in rough seas, may have time to discuss alternatives with his crew; however, a committee meeting at 300 knots or more is a luxury not available to the pilot in command of an airplane. Instead, he must use the knowledge, skill, and ability he has gained from training, experience, and exposure to the problems encountered in flight. Calling this "management" seems to remove some of the authority, responsibility, and accountability denoted by the word "command." The crew, as a whole, is a team dedicated to the safety of a flight. By returning to this concept, we may regain something lost.

The success of a flight is still the art of putting that knowledge, skill, experience, and exposure together to make the airplane perform as you command. There are those who make each flight a milestone in developing skills and perception, and can proudly call themselves pilots. There are others with the label, but often it is unearned.

The simplicity of early airplanes made the fundamentals easier to identify and, therefore, more easily learned. *Straight and level* flight could be seen, felt and heard. Any increase or decrease of airspeed was immediately identified by the change in the sound of the wind and the engine. In a *climb*, when the "wind song" softened and the engine labored, you most certainly knew you were climbing. A *glide* was signaled by a change in the musical pitch of the wind through the flying and landing wires and by a change in the engine tempo. In a *turn*, misuse of the rudder was followed by a blast of wind on the side of the face; from the high side of the bank it signaled a skid, from the inside of the turn you knew you were slipping. As you learned these things they made an indelible impression on your mind.

In the comfort of today's closed cockpit you find instruments capable of signaling how well you perform those same basic fundamentals. It is interesting to note that we can program an autopilot to perform these fundamentals correctly. It would be nice if we could program our pilots as easily. Learning to understand these most fascinating devices can steer you to the ends of the earth and bring you to the end of a runway of an airport you have never seen. They can sort out the storms ahead, measure the wind, even fly the airplane with great skill. We can fly faster than the speed of sound and keep up with the sun. The understanding of these things does not come from the clear blue sky to settle in a pilot's mind. No, it has to be put there by constant study and practice, and it is hard work. In aviation, proficiency training is continuous.

Even with all these wonders, disciplined training in accordance with the rules is still necessary. Here is an example.

In a recent *Jetstar* flight test the weather was at minimum but a good alternate was nearby. On the ILS to landing we passed the outer marker with the gear and flaps down; we weighed slightly over 35,000 lbs. The bug speed for approach was 157 knots and for landing 1.3Vs was 139 knots. On the glide slope this gave about 12 + feet per second sink and forward velocity of maybe 230 feet per second. There was a slight surface wind from the left. Decision height was 200 feet. At 200 feet we were aligned with the runway, but were about one degree off heading to the left. The pilot raised his eyes, saw the slight problem and, rolled in right aileron but failed to use right rudder. The nose yawed a bit more to the left before starting to come around to the right, but time ran out and the corrections came too late. We were unable to land. We missed the following two approaches for the same reason! While holding at the marker for a single turn, we talked about adverse yaw and coordination of aileron and rudder, and from the next approach we landed. Initially, had he applied aileron and rudder properly, the nose would have aligned with the centerline of the runway in time to accomplish the landing.

As you can see, the Wright brothers had the basics pretty well pegged. Preventing yaw was one of the secrets of their success. ■

# FAMOUS FLIGHTS

## Flight of the Pterodactyl

**QN—The Time Traveler™**

*"Everyone has daydreamed about being a time traveler, able to observe at first hand events of long ago. We cannot physically go back in time, but we can create mental images of the past and make the images stronger through books and art and moving reconstructions with film or replicas."*

*This statement was made by Dr. Paul MacCready, a California engineer widely acclaimed for creating seemingly impossible flying machines—such as the first man-powered aircraft. He is now at work on a flying replica of one of the largest creatures ever endowed with the ability to fly—the QN.*

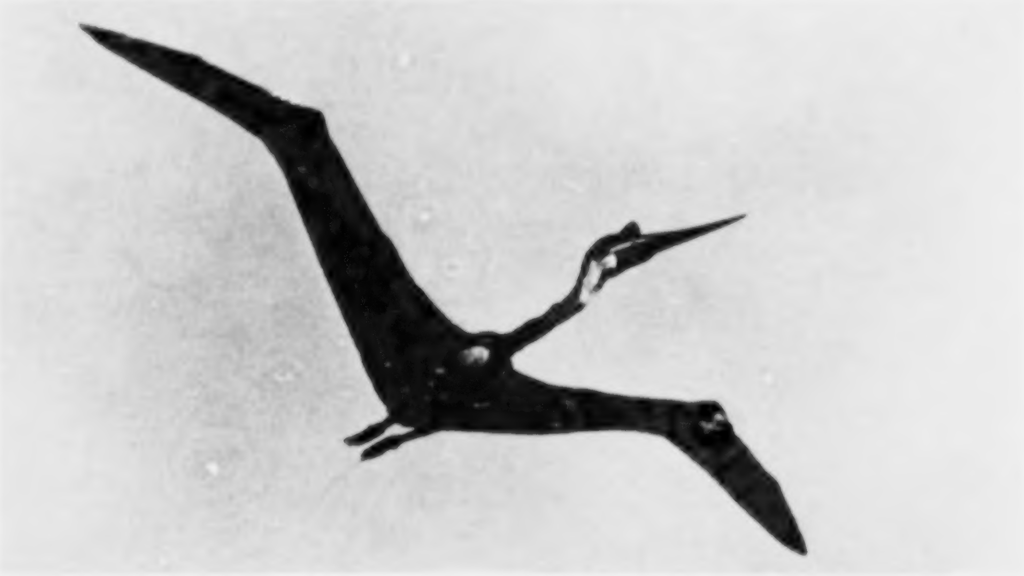
In 1972, the fragmented fossil remains of a pterodactyl, or pterosaur (flying lizard), were found at Big Bend National Park in west Texas—estimated age, 65 million years. When reconstructed, the creature was an amazing 40% larger than all but one other flying creature, living or dead, with a 36 foot wing span. The genus name *Quetzalcoatlus*, after the legendary Aztec serpent god, was given to this huge winged reptile. The species name, *northropi* refers to the tail-less pioneering aircraft known as the Northrop "flying wing." Hence, *Quetzalcoatlus northropi*, or *QN* for short.

Soon after the discovery Dr. MacCready began collecting information on the *QN*, knowing that technology would advance enough one day to make a flying replica possible. As an aeronautical engineer specializing in fluid mechanics, environmental science, and wind energy, MacCready was well aware of the complexities he would have to deal with in constructing this replica. However, by late 1983 he felt that space age technology had advanced sufficiently to make *QN* a possibility. With the encouragement and support of the Smithsonian National Air and Space Museum, Project *QN—The Time Traveler™* was born.

In the summer of 1984 a team of aerodynamicists, engineers, paleontologists, natural historians, and biologists met with MacCready in southern California. They compiled all known data, which was admittedly sparse, on the *Quetzalcoatlus northropi* and started to formulate a design.

The team theorized that the original *QN* was most likely a glider, who could walk rapidly enough to take off from flat ground or a bluff, climb weakly, and utilize updrafts or thermals for sustained soaring. *QN*'s size and weight would put any other flight capabilities on the extreme edge of improbability.

Test models were built of composite materials, beginning with gliders, then moving to wing flappers with radio-controlled wings, ranging in size from 1.0 to 5.5 meters. Each model was designed to test a particular problem before going to the next step. There were three major technical challenges to be overcome—obtaining stability/control around all three axis for gliding; launching the replica into flight; and adding propulsion via wing flapping, sufficient for a gentle climb.

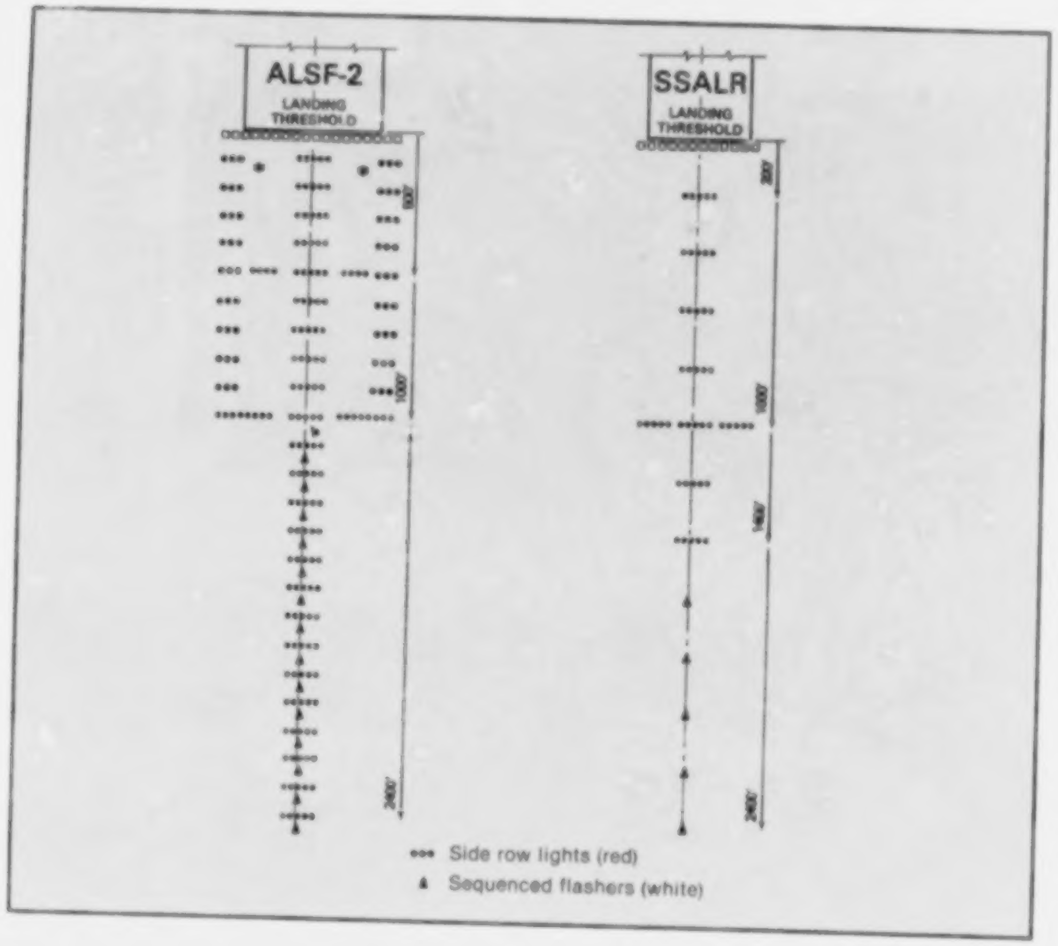


Meanwhile back in Texas, paleontologist Wann Langston had assembled a fiberglass skeleton cast from the *Quetzalcoatlus* bones. This was hung from adjustable slats and the bones were manipulated to find all possible joint movements. Langston discovered that the neck had very little mobility from left to right, but the ball and socket joint at the head and neck would allow rudder-like head movements for stability and control despite the absence of a tail.

Experts theorized that a pterodactyl like *QN* ran on bird-like legs to launch itself into flight. For the replica to take off realistically, leg mechanisms would have to be developed that simulated this running motion—a herculean task for the team. As airborne movement rather than takeoff thrust, was the project's chief interest, the group decided to concentrate on getting the QN to fly, and simply winch the creature into the air like a glider. A wheeled trolley attached to a 4,000′ long winch cable stretched across a field and wound on motor-driven drum served the purpose.

*(continued on page 16)*

*Dr. Paul MacCready,*



## ALTERNATE APPROACH LIGHTS

Pilots who land at major airports equipped with ALSF-2 lights (high intensity approach lighting system with sequenced flashing lights) should be prepared to see the more subdued SSALR (simplified short approach lighting with runway alignment lights). In the interest of conserving energy, FAA has installed the dual mode ALSF-2/SSALR system at many airports with Category II runways. In conditions of relatively good visibility, the control tower will switch over from the power-hungry ALSF-2 to the simplified SSALR.

When this happens the 18 red side row bars disappear, and the 24 steady-burning white centerline bars are reduced to seven. Also, instead of 15 sequencial flashing lights there will be only five. The overall length of the approach light system remains the same (usually 2,400'). At the pilot's request the tower will switch from the simpler to the more extensive system, or vice versa.

FAA is preparing to provide airmen with suitable notices concerning runways with alternate modes of approach lighting, in the instrument approach plate booklets and in the FAA Airport/Facility Directory. There will also be an explanation in the Airman's Information Manual (AIM).

## RUNAWAY INSURANCE COSTS THREATEN GENERAL AVIATION INDUSTRY

Despite the fact that 1985 was the safest year in general aviation since the 1960's, "runaway" costs of aviation liability insurance and litigation are threatening to dry up the production of general aviation aircraft in the near future. This was the opinion expressed by industry experts at an April symposium on product liability, sponsored by the Aircraft Owners and Pilots Association (AOPA) in Washington, D.C.

John L. Baker, president of AOPA, pointed out that the average award in aviation accident liability suits is now over $1 million. As in other industries there is an increasing tendency for the courts to allow expensive judgments against aircraft operators, manufacturers, and repair stations wherever even a remote possibility exists that an alternate action could have been taken to prevent an accident.

Consequently the price tag of new aircraft includes an average figure of about $70,000 for manufacturer's liability protection—up from about $2,000 15 years ago. Operators' liability insurance is escalating proportionately, at a rate which could make general aviation flying an impracticality for most persons in the next decade.

The sumposium produced a number of suggestions for controlling the explosion of liability costs, including Congressional action to limit operators or manufacturers responsibility; FAA rulemaking to raise flight standards and/or stiffen enforcement policies; and improved crashworthiness design.

Most participants, however, agreed that a stepped-up program of accident prevention was the key factor in heading off an even worse explosion of liability costs. They called for a dedicated effort to reduce pilot error accidents (currently accounting two thirds of all accidents), as the best immediate means of protecting the future of flying in America.

## NATURAL FABRICS SAFEST

Dressing for safety in the cockpit means wearing garments made primarily of natural fibers, according to recent research on the flammability of clothing.

Wool and cotton materials were found to self-extinguish more readily than synthetics. Also they are less likely to flare up or transmit heat rapidly, or to shrink or melt onto the skin. Synthetics or plastics worn next to the body increase the chances of severe fire damage considerably.

Another factor women should be aware of is that slacks provide better fire protection than dresses, as a skirt will allow the flames to tunnel up inside causing severe burns.

## GASA AUDIT CONCLUDED

An 18-month FAA "audit" of selected segments in the general aviation industry was completed on March 21, with a final report that showed good overall compliance with regulations and a high standard of safety.

The general aviation safety audit ("GASA") was initiated in 1984, following completion of a similar national inspection of the airline industry. As a result of the GASA findings FAA will now inspect annually the following operations:

- Part 135 operator (travel clubs, contract cargo operators, and cooperate executive fleets which operate large aircraft.
- Certificated repair stations.
- Air taxis that provide unscheduled passengers and cargo service between small communities.

Additionally, the agency is calling attention to a number of findings that apply to non-certificated flight schools so that self-corrective action can be taken. These include a lack of propeller and avionics maintenance in the training aircraft. There is also a need to provide effective instruction by reference to practical test standards, maintain appropriate student records and adhere to industry or school/instructor developed syllabi.

FAA is preparing to hire and train approximately 500 more flight standards inspectors to carry out the necessary safety inspections.

## • Outdated Notice

*I have a "notice" from the General Aviation Accident Prevention Program which tells me to NEVER use automotive fuels in my aircraft. However, the STC numbers SE1931CE (engine) and SA1949CE (airframe) I have for my PA-22 Piper* Tripacer *(Lycoming C-320 A2B engine) authorize the use of certain automobile gasolines.*

*I don't see any date on the Accident Prevention Program notice. Could it be that the notice was issued before the automotive gasoline STC's were issued?*

*Lionel D. Holly*
*La Habra, California*

In a word, yes. The notice was drawn up many years before the appropriate studies on autogas in aircraft took place. It is obsolete.

## • Misplaced Blood Decimal

*As a physician pilot I find your publication very interesting and valuable. I have a question about the news article on alcohol tests in the March/April issue. Shouldn't you have given the prohibited blood alcohol level as .04 percent instead of 0.4 you stated? Probably just a typographical error.*

*Dr. Eugene Colangelo*
*Oklahoma City, OK*

Right you are. Thank you for bringing it to our attention.

## • Radio, Radar Curves

*Just to set the record straight, on the subject of radio and radar paths of transmission for low-flying aircraft, as discussed in your article, "Low Level Cross Country Flying" (March/April 1985), let me give you a physicist's opinion.*

*According to the general theory of relativity all forms of light propagation—radio and radar included—are affected equally by gravity. Light propagation can be refracted—that is, experience a change of direction—as a result of a change in the density of the medium through which it is passing (as when a cloud is encountered). If the change is sudden, the direction of propagation will change suddenly. If the change is gradual, then the direction of propagation may be a succession of changes which appear to us as a curved course.*

*Therefore, as radar traverses a cloud, its course could be curved earthward by the differing physical properties of varying humidity and droplet densities. Thus, given the presence of low clouds it is possible to obtain a radar return from an aircraft which is flying too low to provide a line-of-sight return in the vicinity of a city with tall buildings. Of course, there is no reason why a radio transmission could not be similarly "bent," as your article seems to suggest.*

*Louis Hlousek,*
*Fort Collins, CO*

Agreed, in principle. It is conceivable that radar or radio signals might be bent by propagation through clouds in the manner you describe, but very unlikely. We believe that for the incident in the magazine article, radar contact with low flying aircraft was successful, when radio contact was not, because the radar signal emanated from a long distance radar transmitter. This could provide a line-of-sight propagation, which was not available to radio transmitters in the vicinity of the lost aircraft.

## • Database Updating

*I recently requested and received the avionics database you mentioned in your September/October 1985 issue. I found it very interesting and informative. Are there any plans to update it?*

*I was also wondering if FAA has a similar database for manufacturers of aircraft, their prices, their sales, etc. If so, how can I obtain a copy?*

*Matthew A. Boyle*
*Teterboro, NJ*

We expect to update the avionics database to include 1985 and 1986, and will advise readers when it is available. User comments, including requests for additional items to be added to the base, would be welcomed by the program officer, Duane Van Etten, APC-220, 800 Independence Ave., SW, Washington, DC 20591.

In answer to your second question, FAA does not have an aircraft manufacturers' database. However, several of the aviation industry's "alphabet groups" have compiled such information in publications they offer to the public. Contact the General Aviation Manufacturers Association, Suite 801, 1400 K Street, N.W., Washington, D.C., 20005; (202) 393-1500.

## • Instrument Currency

*Due to having had conflicting input from a variety of sources, I seek your counsel and correct interpretation of FAR §61.57(e)(1) concerning instrument currency.*

*1. May all six instrument approaches be made in an "approved" simulator?*

*2. If so, must the simulator be in the same category as the instrument rating? That is, does someone with an "instrument helicopter rating" have to use a helicopter simulator or vice versa?*

*3. What is the FAR reference for question number 2?*

*James H. Roelker*
*Bellevue, WA*

FAR §61.57 states that an instrument pilot must have ". . . logged at least six hours of instrument time under actual or simulated IFR conditions, at least three of which were in flight in the category of aircraft involved, including at least six instrument approaches, or passed an instrument competency check in the category of aircraft involved."

All six approaches may be in an approved ground trainer, but all six approaches do not have to be in the same category as the instrument rating. There is no further reference in the FAR's, other than §61.57. The policy interpretation has been formulated by FAA's Airman Certification Branch and the Office of the General Counsel.

**FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.**

## • 24 Hour Duty Time?

*The article titled "New Aircrew Rest Rules" contained in the Nov/Dec 1985 edition of FAA GENERAL AVIATION NEWS stated, that major airlines have new flight time requirements that assure adequate rest periods. While some operations may have been so affected, I cannot agree with the statement in its entirety.*

*FAR 121 still allows some operations, such as supplemental non-domestic, where crews fly up to twelve hours within a twenty-four hour period. For many crew members, this means (and easily results in) continuous duty periods exceeding twenty hours or more. Preflight and coordination actions, enroute stops, and weather or maintenance delays, in addition to flight time, produce an added amount of fatigue and other adverse effects which should not be ignored. Twelve hours of ground duties plus twelve hours of flight can add up to a continuous duty period of twenty-four hours. Where is the provision for adequate rest under these conditions?*

*Name withheld*

The rule change you refer to addressed flight time limitations and rest requirements only during scheduled domestic air carrier operations. Amendment of the flight time limitations for supplemental or nonscheduled operations may be proposed in future rulemaking.

## • "Chance of" Weather

*I recently received the following terminal weather forecast: "Ceiling 900 overcast, visibility 2 miles, with a chance of ceiling 300 overcast and visibility 1 mile in thunderstorms."*

*If there is a chance of the ceiling being below 600 feet or the visibility being less than two miles, does that invalidate the use of this airport as an alternate for an IFR flight plan? If so, does this apply as well to transient weather phenomena such as thunderstorms?*

*Cyril Toker, M.D.*
*Potomac, MD*

If the official forecast indicates that there is a "chance" or a "slight chance" of the ceiling or visibility being below alternate minimums, or that this may occur "occasionally," you may not legally use the airport as an alternate in your flight plan. Note that weather minimums for instrument approaches at an alternate airport differ from the minimums that apply when using the airport as a primary destination. Standard alternate minimums (FAR Part 91.83) are 600/2 for precision approaches and 800/2 for non-precision. Alternate minimums for published approaches are found in the front section of the instrument approach chart booklets.

The forecast of thunderstorms or related weather phenomena does not affect the selection of an alternate airport.

Incidentally, with regard to precipitation the expression "chance of" may be used when the probability of this phenomenon occurring is 30-50 percent or less. "Slight chance of" means a 10-20 percent probability. "Occasional" means a probability of greater than 50 percent, but the event is not expected to persist for more than half of the forecast duration time.

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*(continued from page 13)*

Inflight propulsion by wing flapping was no problem in itself. The biggest problem was to achieve pitch stability and controllability without a movable tail. The solution was an onboard autopilot that would continually adjust the center of lift relative to the center of gravity as the wing moved fore and aft in the manner of tailless birds.

By the end of 1985, the team had built their fifteenth and last model, incorporating all of the carefully tested findings. The size was that of a young pterodactyl of 44 lbs., with an 18 foot wingspan. The computerized autopilot was linked to a pitch-rate gyro and an angle-of-attack vane as sensors. All commands could be overridden by a ground-based operator via radio.

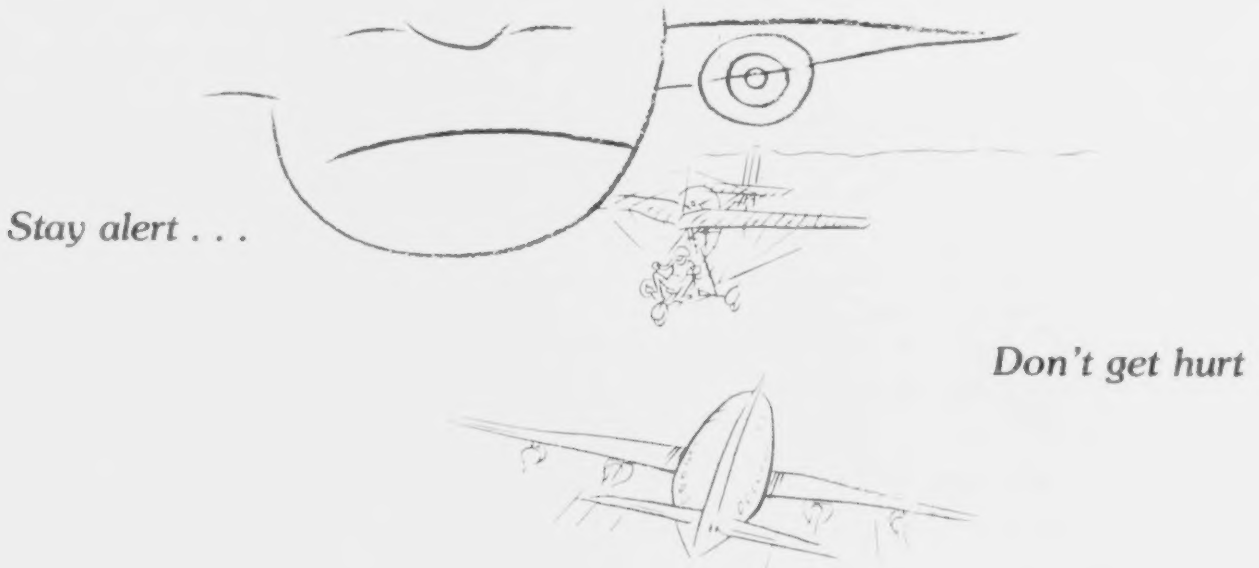
Power for the flapping motion was supplied by two one-horsepower samarium-cobalt DC motors, powered by six pounds of nickel-cadmium batteries. (This is enough for five minutes of fully powered flight; gliding will extend that time.) Three independent motion control systems provided (1) wing twist for achieving lift and controlling roll, (2) wing sweep for controlling pitch, and, of course, (3) flapping as a source of thrust. In varying atmospheric conditions, the computer "brain" would automatically alter the wing's shape and movement. A tail section was provided for stability in takeoff, but would be dropped off soon afterwards and the head would act as the rudder. A simulated cluster of rudimentary fingers (which gives the pterodactyl its name—dactyl means finger) on each wing would act as spoilers and drag breakers.

*QN* was made as biologically natural as possible with an enormous orange broadsword of a bill and glassy green eyes set in a large blue head. A layer of short stiff hair covered the neck and body. Carbon fibers and foam with latex covering were used to make the wings.

After a vexatious series of mishaps, breakages and repairs, the final moment of truth for *QN* came late on the afternoon of January 7, 1986, over the sands of El Mirage dry lake in southern California. After launch, first the trolley was dropped with the tail boom. Then the huge flying reptile was outlined against the desert sky much as it might have looked some 65 million years ago. The long head swerved from side to side, the broad wings flapped gently and moved back and forth in response to air currents and electronic instructions. The flight lasted only two minutes, but a long journey back in time had begun.

What is the value of an oversized model airplane designed to look like a pterodactyl, with a price tag of about $500,000? In Dr. MacCready's view *QN* is much more than a scientific curiosity or toy. In duplicating the largest known creature able to fly, we have an opportunity to unravel new and perhaps vitally important secrets about a phenomenon which has always fascinated human beings: flight.

*QN* will have a major role in a new film which will explore the relationship between natural and mechanical flight. The film, "On the Wing," will be shown on the special wide screen of the world's most popular museum, the Smithsonian Air and Space Museum in Washington, DC, beginning on June 20. Subsequently, it will also be shown at cultural centers in Cape Canaveral, Denver, Los Angeles, New York and Seattle, as well as in many foreign countries. ■



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# FAA general aviation NEWS

JULY-AUGUST 1986

A DOT / FAA FLIGHT STANDARDS SAFETY PUBLICATION

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- *AWOS, p. 4*
- *Famous Flights, p. 7*
- *Chopper Croppers: Rollover, p. 12*

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U.S. Department
of Transportation
**Federal Aviation
Administration**

# FAA GENERAL AVIATION *NEWS*

**JULY/AUGUST 1986
Volume 25, Number 4**

Elizabeth Hanford Dole, *Secretary of Transportation*

Donald D. Engen, *Administrator, FAA*

Anthony J. Broderick, *Assoc. Admin., Aviation Standards*

John S. Kern, *Director, Flight Standards*

Carol S. Rayburn, *Manager,
General Aviation and Commercial Division*

Gary D. Koch, Sr., *Manager,
Accident Prevention Program Branch*

David Gelfan, *Editor;* P.A. Duncan, Louise Oertly,
*Associate Editors*

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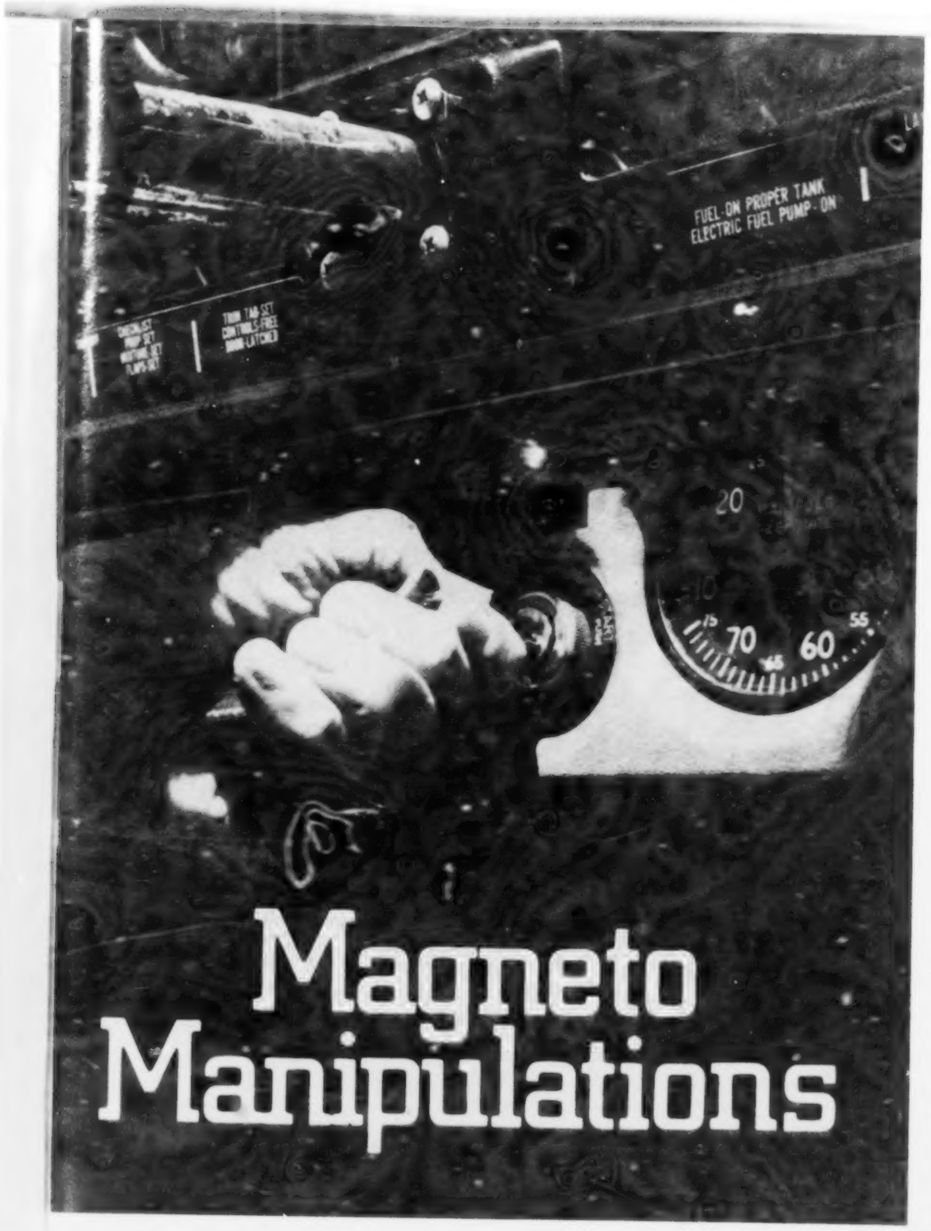
## BRIEFS

"DOPPLEGANGER." FAA has installed an experimental weather radar system at Huntsville, AL which can actually measure the speed of winds inside storms. The trial system is a forerunner of the terminal Doppler weather radar system that FAA plans to install at major airports in 1989. Whereas conventional radar can only display precipitaiton, Doppler radar reflects wind movement. A "twin" Doppler system, such as the Huntsville installation, can obtain three-dimensional information about winds moving toward or away from the test site.

AFTER YOU. FAA has issued an Airport Safety Alert as part of an effort to reduce the number of reported runway "incursions" at tower controlled airports. An incursion means an unauthorized aircraft movement on a runway or taxiway, usually resulting from a communications breakdown between pilots and tower or airport personnel. Pilots are urged to study the latest runway/taxiway diagram of unfamiliar airports, if available, and to operate only as directly advised by the tower or ground controller or local control. The September/October issue of FAA GENERAL AVIATION NEWS will have a feature article on what pilots can do to prevent runway incursion incidents and accidents.

EXCHANGE RATE. For those who have a need to telephone FAA Headquarters in Washington, DC, be advised that the old FAA telephone exchange since time immemorable--"426"-- has been changed to "267." The final four digits of division and branch offices will remain the same; for example, the Accident Prevention Program Branch's old number (202) 426-8102 is now (202) 267-8102. FAA is in the process of changing over to a new telecommunications system which will save the government millions each year.

POLARIZED PROBLEMS. A pilot wearing polarized sunglasses reported problems spotting traffic. The sun was behind him at near noon, and the conflicting aircraft was approaching from the left, as reported by the controller. The pilot finally flipped up his clip-on polarized sunglasses, and the airplane snapped sharply into view. Polarized lenses embody a matrix which reduces glare by means of a polarizing light in one direction. However, the combination of a laminated windscreen and a polaroid lens may produce polarization of light in two planes, thereby blocking vision.



# Magneto Manipulations

Practically all pilots are aware of and carry out the preflight magneto rpm drop check recommended for most piston engine aircraft. But relatively few pilots in this country are acquainted with what are known as magneto check and hot mag checks—a fairly common practice in countries like New Zealand and Australia, where maintenance facilities are often far apart and pilot preventative maintenance is highly important. American pilots might want to take a lesson from "down under" airmen in this respect.

A magneto check is made by switching from both magnetos to each individual magneto, in order to determine whether they are both functioning. A hot mag check simply determines whether the off switch properly turns both magnetos off (or each magneto, in the case of individual toggle switches).

The hot mag check should always be done with the engine at a *low or idle power* setting (usually 600 to 700 rpm). For a rotary switch the sequence might be BOTH-LEFT-RIGHT-OFF.

You might argue that the usual rpm drop check will obviously tell you if any magneto is really defective. So it will—but it may cost you a bundle. In order to be meaningful, rpm drop checks are carried out at fairly high power settings, somewhere between 1,600 and 1,800 rpm, in accordance with manufacturer's recommendations. If at this power you switch to a magneto that is dead, you may go from cruise rpm to zero instantaneously, which can be very damaging to the engine's crankshaft and other internal parts. In a horizontally opposed engine, for example, your counterweights may fly off.

In fact, when your engine is running on a dead mag and it falters, if you succumb to the common human tendency to try to keep the engine running by switching quickly back to BOTH, you may produce a detonation that will be long remembered. Not a good way to start on a vacation flight, unless you have unlimited time, cash reserves, and patience.

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With most engines the mag check procedure, undertaken during preflight, will identify a bad mag for you safely at low rpm, at your home base, where you can have it replaced in short order and be on your way safely. Making sure that both of your magnetos are in good health before you start on a long flight is very good insurance against trouble en route. Not only does the second magneto act as a failsafe backup for the ignition system, but the additional power produced by a second magneto could make a significant difference in the fuel consumption rate or in your available power in an emergency.

The live mag check is simply a matter of going to the off position for both mags while the engine is running at *low rpm*, in order to determine whether the grounding mechanism (which interrupts the flow of electricity from the mag) is functioning. A hot mag means the engine could start simply by someone moving the prop, and you know what that could mean to anyone who handles that prop inattentively.

But this is not the only hazard associated with a hot mag. If you attempt an rpm drop check and one or both of the magnetos cannot be switched off, you will get an erroneous reading and have no ready means of determining whether the engine is putting out full power until you take off.

The magneto rpm drop from the check must be done somewhat differently (apart from the fact that at no stage are both magnetos switched off intentionally). The particular power setting at which the check is carried out is not very important, although to avoid possible engine damage it should be consistent with the recommendations of the engine or aircraft manufacturer. From the point of view of determining the magneto's condition, the important thing is that the check on any particular aircraft be *repeated at the same power setting*, so that any trend can be noticed and monitored. There is little to be learned, for example, in comparing today's 150 rpm drop, at 2,000 with yesterday's 100 rpm drop at 1,700 rpm.

Especially for horizontally opposed engines, the amount of rpm drop is not nearly as meaningful as the difference in the drop between the two paired magnetos. For some aircraft a drop of as much as 200 rpm might be of little concern, if the drop is smooth, is similar for each magneto, and is consistent with previous checks. The tolerable variation between paired magnetos varies with each make and model of aircraft, but 50 rpm would normally be a maximum figure.

A mag drop check should never be carried out in haste, as this could contribute to erroneous readings or even to engine damage. When you have switched to a single magneto, the engine should be run for at least five seconds so that the resulting lower rpm has a chance to stabilize and be noted. On the other hand, it is best not to run on one magneto longer than about 15 seconds at most, in order to prevent undue accumulation of fuel or oil fouling on the inactivated spark plugs.

The *sequence* in which you switch from one magneto setting to another during the mag drop check is also important. For a rotary switch it should be BOTH-LEFT-BOTH-RIGHT-BOTH. Although many persons shortcut this sequence, there is a good reason for going back to BOTH before switching from one mag to the other (and for observing a slight pause before going from one toggle switch to the other). This allows the engine to stabilize at the same normal rpm before each mag drop begins, thus assuring a valid reading.

Finally, another caution about inadvertent shutdowns. When moving the rotary switch from BOTH to RIGHT, you may occasionally slide past the second click to the OFF position. This is most likely to happen when you are operating a particular aircraft for the first time, and have your eyes fixed on the rpm readout while running the check. If this does occur during a mag drop check and the engine stops firing, allow it to die peacefully and then go through a normal restart. Flipping the switch hurriedly back to BOTH is asking for serious damage, as indicated earlier. ■

*(This material was based in part upon an article on "The Basics of Magneto Check," published in the February 1986 issue of New Zealand* Flight Safety. *Readers are reminded that the recommendations of individual manufacturers would take precedence over any procedures suggested here.)*

# AWOS

## The final solution for real time destination weather

A traditional way of implying that something is unpredictable is to say that it is as changeable as the weather. While a sudden weather shift may be merely inconvenient for the man on the street, it can have serious consequences for an airman. From the first days of flight training a student pilot is drilled in the close relationship between the weather and aircraft performance. Nevertheless, the continuing hazard presented by changing weather conditions is very apparent in the official accident reports.

The most recent National Transportation Safety Board publication providing statistics on weather involvement in general aviation accidents is the 1982 Annual Review of General Aviation Accidents. From that publication, for the six-year period 1977-1982, weather was cited as a cause or related factor in 23.6% of all accidents and 39.3% of fatal accidents.

In flight planning pilots are concerned about two kinds of destination weather: forecast weather and existing (or "real time") weather. *Forecasts* are generated by the National Weather Service, or by other professionals, on the basis of a variety of inputs and calculations, but real time weather must be observed at the airport site. For a general aviation operation in visual meteorological conditions (VMC) the pilot may legally inspect the weather from the air and make his own decisions about landing. But for any instrument operation the pilot must obtain, as a minimum, a local or nearby altimeter setting from a qualified observer using calibrated equipment, before beginning an approach. Air carrier operations also need a visibility observation.

At the present time hourly surface weather observations are taken at approximately 595 major airports within the United States by observers of the National Weather Service, FAA operated control towers, or Flight Service Stations. If an airline wishes to have current weather information at an airport not served by the Government, then they must arrange for the service themselves. These observations are taken at designated Supplemental Aviation Weather Reporting Stations (SWARS), using observers and equipment provided by the parties needing the service. SWARS observations are currently taken at 207 airports and are not routinely available to other users.

Many of the 802 observation stations described here do not operate full-time; instrument operations by commercial operators are restricted at 376 of these airports because of part-time operation of the weather facility.

These 802 airports are fortunate to have local weather observations. Operations under instrument flight rules are restricted for commercial operators at over 1,200 other airports with instrument approaches because they do not have a local weather reporting capability.

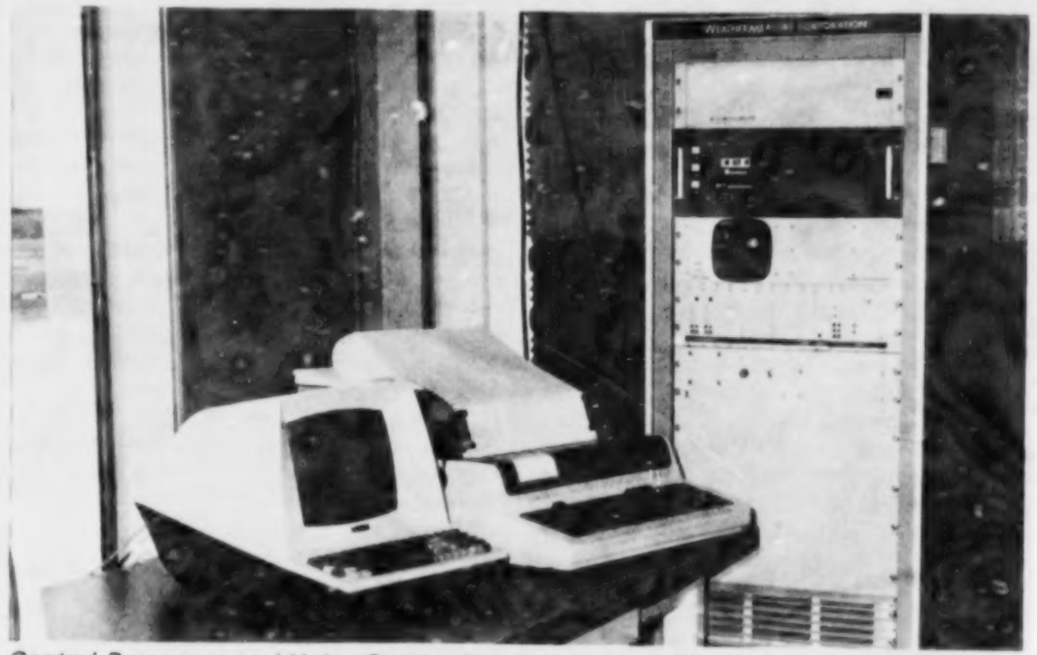
Some airports have instrument approaches for which nearby altimeter settings may be used, but the minimums are usually raised to compensate for the remote locality. In most cases an additional five feet will be added to the minimum descent altitude for every mile of distance, in excess of five miles, from the airport to the altimeter site. For air carrier operators this increases the number of instances when the destination airport will be below minimums and the approach cannot be made.

Pilots are expected to understand that the actual weather at their intended destination may be very different from the weather observation obtained from the nearest available source. There are approximately 8,000 public use airports in the United States. Given the changeable nature of weather and the mere handful of weather observers on duty, it is obvious that at most airports real time weather will simply not be available.

This is normally not too much of a problem for VFR operations in daytime and in clear weather, but if the weather is marginal or it is after dark, local weather information could become important. A UNICOM operator, incidentally, is not normally a trained weather observer, but UNICOM may be an approved altimeter source if so noted on the approach plates.

Thankfully, a solution to the problem of providing real time weather on a practical basis appears to be at hand. After more than a decade of study, design work, testing, and field demonstrations, FAA has developed a fully automated weather observation system (*AWOS*) which could have a dramatic effect on accident prevention.

AWOS consists of a cluster of modular sensors and a central microprocessor. Incoming weather data is immedately processed into a weather report on a continuing basis. A computer generated voice transmits the report to inbound pilots via the radio voice output of a NAVAID or a dedicated frequency. The transmission can be continuous or radio-activated by a pilot. Additionally, most systems can be accessed by telephone. All sensors are self-monitoring and will shut down (i.e., report information "missing")



*Central Processor and Voice Synthesizer (large, upright box) and computer print-out equipment for Atlantic City AWOS* when an error is detected. The weather information is updated every minute on a 24-hour basis. The following bits of information may be provided:

### AWOS-I

- Altimeter setting
- Windspeed, direction, gust strength
- Temperature
- Dewpoint
- Density altitude (if D.A. is more than 1,000′ over the field elevation)

### AWOS-II

AWOS-I data plus visibility

### AWOS-III

AWOS-I and II data plus:

- Cloud heights, amount, and type of sky cover

Additional optional equipment, which may be approved in the near future (some systems are still under development), will report on: runway surface condition, precipitation (frequency of occurrence and type), lightning, obstructions to vision (dust, smoke, haze, etc.).

## Highlights of Selected Sensors

ALTIMETERS. Two pressure sensors. The maximum allowable error is .02 in Hg.

WINDSPEED AND DIRECTION. The range of response is between 2 knots and 85 knots.

AMBIENT TEMPERATURE. The range is from −65°F to +130°F for Class 1 systems, and from −65°F to +130°F for Class 2 systems.

CLOUD HEIGHTS AND SKY COVER. Valid up to at least 5,500 feet, optionally to 12,000 feet. Accurate within 100 feet. Reports "clear," "scattered," "broken," or "overcast."

VISIBILITY. The range is from less than ¼ mile to 10 miles.

TIME. Real time (0000 to 2359) is based on Coordinated Universal Time, which has replaced Greenwich Mean Time for aviation purposes.

The latest option is runway sensing. Sensors imbedded in selected runways report on actual conditions (dry, wet, icy) but also draw data from other sensors (air temperature, windspeed and direction) to predict forthcoming icy conditions and alert airport personnel to potentially hazardous situations.

FAA is currently preparing a selection of some 400 non-tower airports and heliports with instrument approaches which would derive the greatest cost benefit—in terms of safety and service—from the installation of an AWOS unit. The agency will install and maintain these units at Federal expense. They will be commissioned over the next five years.

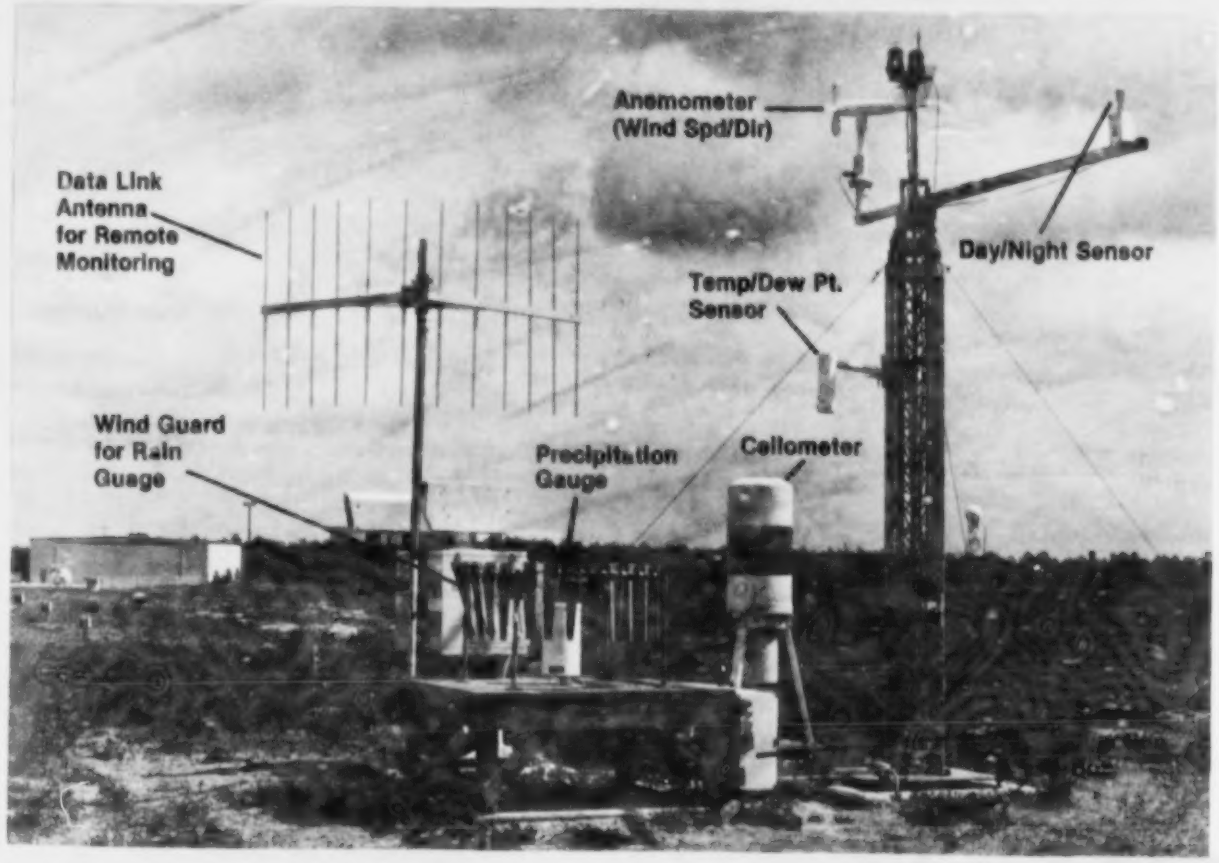
Additionally, funds are now available under FAA's Airport Improvement Program to assist public-use airports in selecting, purchasing, and installing AWOS units in accordance with their needs. FAA has established standards for automated weather observing equipment funded by this program which are acceptable for instrument approach information. These criteria are published in the FAA Advisory Circular 150/5220-16 (Automated Weather Observing Systems for Non-Federal Application). The AC has been sent to interested airports; some additional copies are available, without charge, from the Office of Aviation Standards, AAS-200, 800 Independence Avenue, S.W., Washington, D.C. 20591.

As these automated weather sources come into use they will be listed in the FAA *Airport/Facility Directory*, as well as in non-government publications. At the present time there are about 22 airports and three heliports with some form of automated weather observing station. This includes some dozen test models left over from the AWOS demonstration program and now maintained by the airport, as well as a variety of earlier models dating back to 1979.

Specifications for new production equipment are published in the new AC cited above (Advisory Circular 150/5220-16). A grace period of three years has been granted for updating and modifying the older equipment in accordance with the new specifications, which contain uniform guidance on siting, certification procedures, and other information critical to safe operation.

Although AWOS was primarily designed for the benefit of aircraft making instrument approaches, it will also provide a wealth of information for VFR pilots. Real time weather information can prevent a lot of unhappy surprises at the termination of a flight and discourage the "Let's go down and have a look" attitude among pilots with low fuel supplies and an unwarranted optimism about the weather.

Fewer surprises should mean fewer accidents.


Anemometer (Wind Spd/Dir)
Data Link Antenna for Remote Monitoring
Day/Night Sensor
Temp/Dew Pt. Sensor
Wind Guard for Rain Guage
Precipitation Gauge
Ceilometer

*AWOS installation at Atlantic City, NJ*

Examples of recent landing accidents, which might have been avoided if some source of current local weather observation had been available at the airport and used to forewarn pilots of prevailing weather conditions, are all too numerous. A common cause factor is a shift in wind speed or direction which escapes the pilot's notice.

- **Crosswinds.** On the afternoon of June 6, 1984, a 22-hour student pilot, flying solo in a Grumman American trainer, departed Bermuda Dunes Airport, CA for an hour of local practice. The weather was clear, visibility 20 miles, and the wind westerly at ten knots. When the pilot returned to the airport about 50 minutes later the weather conditions appeared unchanged. But in fact the wind had risen and was gusting to 25 knots across the runway.

Bermuda Dunes is located in open desert country between Palm Springs and Thermal, CA and sudden wind changes are common on hot afternoons. The airport does not have a tower, and the nearest weather reporting station is the Flight Service Station at Thermal.

According to the report filed late by the National Transportation Safety Board, the pilot lined up for a straight-in approach to runway 29, without circling the field. During the landing flare the pilot appeared to lose control and the left wingtip struck the runway. The aircraft veered off the runway and collided with a parked Cessna 172, then struck a fence, nosed over, finally coming to rest inverted. Damage was substantial and the student pilot suffered minor injuries.

- **Turbulence.** On July 8, 1984, the pilot of a Cessna *Skyhawk* departed Waukegan, IL for a half-hour flight to Americana Airport at Lake Geneva in south central Wisconsin. The flight was accomplished in smooth, clear air, according to the pilot's statement to the Safety Board. However, he reported that on short final, at an altitude of about 100 feet above the ground, severe turbulence was encountered. He stated further that the passenger in the right front seat, who was wearing a shoulder harness, was thrown forward by the turbulence onto the control yoke, pushing the nose of the airplane down and instigating a bank to the left. Control could not be reestablished in time to prevent a hard landing, followed by collapse of the nose gear. There was significant structural damage but no injuries to the pilot or his three passengers.

Several other pilots operating at Americana within the hour reported encountering turbulence and windshear. The reported winds at Janesville, WI, the nearest official weather observing station (approximately 29 miles to the west), were from 170° at 15 knots, gusting to 25.

- **Windshear.** At the same Americana Airport, a year later, a Falcon 50 (Trijet) was destroyed by fire after landing short of runway 23, which has a dropoff of from six to 10 inches all around. The pilot reported experiencing a heavy sink rate on short final, which he was unable to counter with added power. The main gear touched down in a grassy area, about 13 feet short of the runway threshold. As the jet continued over the lip of the runway, the gear collapsed and a fire broke out toward the rear of the cabin when hydraulic lines ruptured and metal was dragged over the pavement. Fortunately, all on board were able to exit the airplane without injury.

At the time of the accident, Milwaukee FSS (31 miles northeast of Lake Geneva) was reporting wind from 230° at 15 knots with gusts up to 25 knots. Other pilots who frequently use Americana testified that local wind shifts on gusty days were not uncommon because of the hills surrounding the airport to the east and southeast.

- **Wrong wind direction.** On August 7, 1984 a Cessna *Skyhawk* went out of control during the landing flare and was blown off the runway. The pilot, who had less than 190 hours total experience, told the Safety Board that "UNICOM reported wind 190° at 5-7 knots," and he elected to land on runway 27. However, at approximately 40 feet above the ground "...winds seemed to come from everywhere. I was able to set down, but was immediately picked up and thrown to the left, although I had used right aileron..." The airplane eventually struck a fence at the left side of the runway and turned over.

Immediately after the accident the wind at the airport was determined to be 90° at eight knots. ■

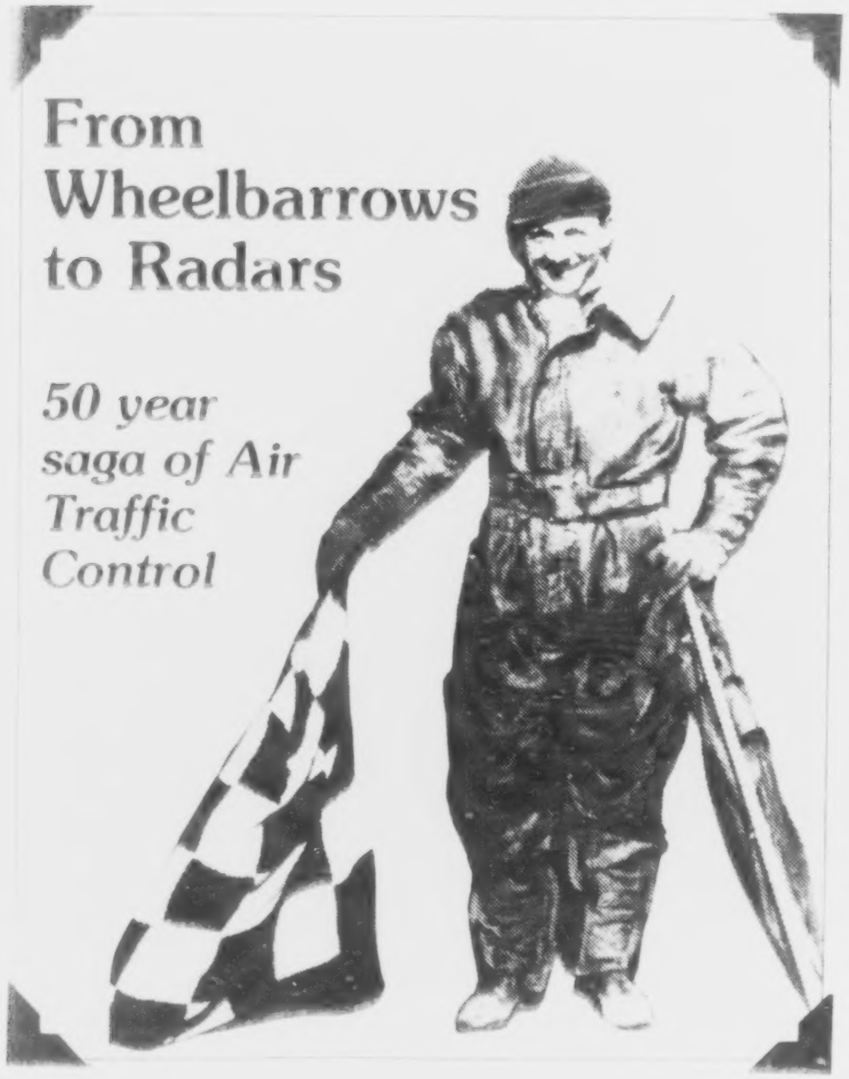
### AIRPORTS WITH SOME FORM OF AUTOMATED WEATHER SERVICE

(Check Airport/Facility Directory for Current Status)

| *State/City* | | *Airport* |
|---|---|---|
| CA | Columbia | Columbia |
| | San Martin | South County |
| GA | Dalton | Dalton Municipal |
| IA | Ames | Ames Municipal |
| IL | Kankakee | Greater Kankakee |
| LA | De Ridder | Beauregard Parish |
| | Natchitoches | Natchitoches Municipal |
| | Opelousas | St Landry Parish |
| NC | Ocracoke | Ocracoke Island |
| | Salisbury | Rowan County |
| NE | Omaha | Millard |
| OH | Columbus | Ohio State University |
| OK | Ardmore | Executive Downtown |
| | Norman | Westheimer Airpark |
| PA | Hazelton | Hazelton Municipal |
| | State College | University Park |
| | St Marys | St Marys Municipal |
| VA | Lynchburg | Lynchburg Municipal |
| | Martinsville | Blue Ridge |
| | Staunton/Way | Shenandoah Valley |
| | Winchester | Winchester Municipal |
| WA | Bremerton | Bremerton National |

# From Wheelbarrows to Radars

## *50 year saga of Air Traffic Control*



By this time everyone is probably aware that air traffic control is celebrating its 50th year under Federal government operation. But what most people do not realize is that the system had to be built from scratch, with the first controllers using their ingenuity and imagination as they went along.

The earliest documented air traffic controller was a converted airplane mechanic, named Archie League, at St. Louis' Lambert Field. He carried his equipment to the active runway (as indicated by the wind) via a wheelbarrow. This 1929 standard equipment included two flags for signaling aircraft, a huge sun umbrella and a portable chair for comfort, and a large cloth wind tee to indicate direction of landing.

The year 1930 saw tremendous progress. The wheelbarrow and the umbrella were abandoned, and radio-equipped, glass-enclosed, control towers were built for communicating with incoming and outgoing aircraft. Cleveland was the first, with Chicago, Newark, St. Louis (with Archie League still in control), and Washington, DC soon following. Since many aircraft were still not radio-equipped, a light gun was another piece of standard equipment in these early towers. However, by 1932 most airliners were two-way radio equipped.

As flight instruments were developed for all-weather flying, it soon became apparent that control just around the airport area was not sufficient. Airspace separation became all important, as electronic "skyways" brought aircraft close together and the danger arose of aircraft colliding along their routes as they flew through the clouds. Soon it was a Federal requirement for all airline pilots to be instrument qualified.

A "flight watch" system was derived by American Airlines in the Chicago area where the airline dispatchers, via company radio operators, would send information and instructions to the American flights. The idea soon caught on and by fall of 1935, American, TWA, United, and Eastern formed the cooperative, "Air Traffic Control, Inc." This had the blessings of the Bureau of Air Commerce, with the promise that the Federal government would assume responsibility as soon as funding could be found. On December 1, 1935, Newark had the first of the group's Airway Control Stations operating in an unused loft near the airport and controlling air traffic within a 50-mile radius. A second station opened in Chicago in April and a third at Cleveland in June.

Fifteen controllers were selected for training, with a promise of getting their old airline jobs back if the project failed. The salary was $200 a month; with a staff of six the station would cost an estimated $6,000 a month to run. The only equipment supplied by the government was a wall clock. It was up to the men to set up the system.

These stations did not have direct radio contact with the flights. They would have to rely on airline dispatchers and tower controllers to phone in flight data, which was then written on a blackboard. This was translated onto a map table by means of small metal or wood "shrimp boats" which contained a slip of paper with the flight number, point of origin, destination, and altitude. These in turn were to be moved as new coordinates were received. If it became apparent that there would be conflicting patterns, this information was telephoned to the airline dispatchers, who in turn would radio the airplanes in question. Later the blackboard would be replaced by paper strips in moveable holders, which were pushed along a plotting board as new flight data was received.

The efficiency of this system left much to be desired, especially with the inevitable delays as information was transmitted, translated, charted, and transmitted again. The risk of potential error was high, and responsibility became a sensitive issue. So a recording system was devised using a business dictating machine.

The equipment was adapted to record the interphone conversations on a heavy wax cylinder, which was very fragile. At the end of each day these cylinders were shaved for reuse. It became a standing joke that if the station's part in an incident was in question, there was a sudden rash of midnight shavings or dropped cylinders that day. Cylinders proving innocence always seemed to be available. How true this was is not certain.

It was July 6, 1936 before the Bureau of Air Commerce finally obtained $175,000 for the takeover of the stations. The three facilities were officially placed under Federal control and designated airway control stations with a total of 76 airways were established across the country. Control was extended to include general aviation and military aircraft, not just airliners.

However, the transfer was easier said than done. The early controllers were not used to dealing with government red tape. In many cases the men used their own money to have equipment installed or work done rather than wait for the government paperwork to get around to it. One of the original controllers still has an invoice for having lights installed in the station: He did not get permission first, so he never got reimbursed.

A major problem was salary. The Federal government was only going to pay $2,000 a year, or only $167 per month. The controllers felt they could make more money in their old jobs, and many gave in their notices effective as of the end of the month. The government quickly convinced them to stay, pointing out assistant managers made $2,900 and managers, $3,500. As plans were in the works for expansion, rapid advancement was guaranteed. By mid-1937 eight stations existed coast-to-coast operating 12 to 16 hours a day.

Expansion, however, brought its own problems. One that soon became apparent, as more stations were opened, was the overlapping of station coordination at borderline airports. Without direct interphone communication between stations, just teletype, it was possible that two different stations were controlling aircraft in and out of an airport at the same time. By 1938 several incidents caused a revamping of boundary lines to make one station responsible for all traffic within a 25 mile radius. This was signaled by a name change from Airway Control Station to Airway Traffic Control Center.

*(continued on page 16)*

# Severe Weather Avoidance

*". . . like riding an elevator operated by a madman."*

Summertime is usually the busiest flying season in general aviation and also the most pleasant. But for much of the country it is also the season when the most severe and violent weather of the year appears—notably thunderstorms, turbulence, hail, hurricanes, tornadoes—and their associated hazards. This is because the fueling elements of such storms, essentially water and thermal heating, are most readily available in the period from June to October.

Stormy weather also develops much more rapidly in summer, when the air is generally less stable than in winter. On a July day a sky that is relatively free of clouds at dawn may be overcast and ominously dark at noon. The hot sun heats up the terrain and currents of rising air carry moisture to an altitude where it condenses into clouds. "Fair weather" clouds—or something serious? The naked eye alone should not be relied on to predict the weather, even for short cross-country flights when only a few innocent-looking "puffballs" are present. Without a complete weather briefing you can easily become trapped by abruptly forming clouds that cut off your retreat as well as your flight path ahead. The base of severe storms can extend to within a few hundred feet of the surface, with tops over 50,000 feet.

Area and terminal forecasts developed by the Weather Service are based on local observations as well as radar and satellite coverage, PIREPS, and a broad range o meteorological data. While FSS briefers wi not be able to tell you the exact momen *when* or the precise location *where* a storm will occur, they can pretty clearly designat areas where conditions are ripe for such a tivity during a given period of time.

The wary pilot will avoid like the plagu such threatening areas.

A thunderstorm is believed capable generating more destructive force than large atomic bomb. The dangers of encour tering heavy rain, hail, and lightning ar easily understood, but turbulence almost ha to be experienced in order to be properl respected.

Turbulence, in reference to a body of air, is defined as a violent commotion or agitation. Weather turbulence is primarily made up of vertical currents of air within and around clouds, although there may also be lateral or rotary movement at the edge of the clouds. It is encountered by the pilot as a sudden wind thrust, driving the aircraft up, down, forward, backward, or sideways—depending upon the segment and the phase of the storm at the time of encounter. At cruise altitudes the thrust is usually vertical; updrafts often alternate with downdrafts, giving the impression one has been locked in an elevator operated by a madman. The updrafts can reach a velocity greater than 6,000 feet per minute.

In addition to moving in a given direction the air is often also churning and twisting, shaking the aircraft "like a pair of dice in the hands of the devil" as the old saying goes. Near the tops and the base of the storm the air currents move in a more lateral direction, usually with reduced velocity but often with more of a whirling motion. Significant turbulence can be felt as far as 30 miles distant from the associated storm—and several thousand feet above or below it. The greatest lateral area of disturbance is usually in front of the advancing clouds.

*Severe turbulence can tear the wings off an airplane.* Even what is described as "light" turbulence by an air carrier can shake a small plane to a point where it is difficult to read the instruments or charts—which often leads to disorientation and straying off course.

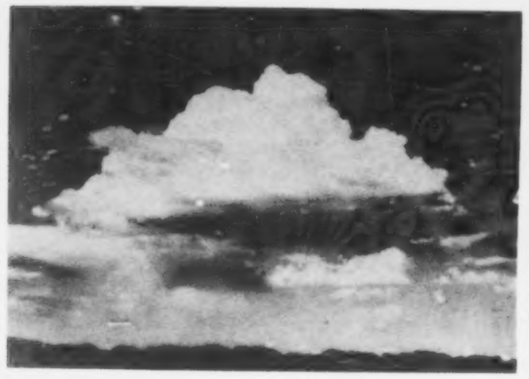
There is only one safe way to deal with thunderstorms: AVOID THEM.

For VFR pilots this would seem to be a fairly simple matter, since they are required to stay out of clouds. However, accident statistics of the National Transportation Safety Board show that about half of the thunderstorm-related accidents involve VFR pilots.

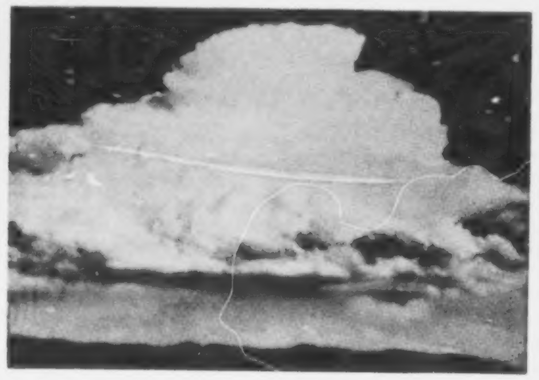
*How does this happen?* A common scenario describes a flight through a low pass in the mountains, several thousand feet below an overcast. The pilot keeps a watchful eye on the cloud cover to make certain that he retains maneuvering room, but what he cannot see are the thunderstorms imbedded in these clouds. As the storms mature, strong downdrafts extend almost to the surface, causing the pilot to lose altitude and fly into terrain obstructions while attempting to turn back.

Some indicators that you are approaching the center of a mature thunderstorm include:

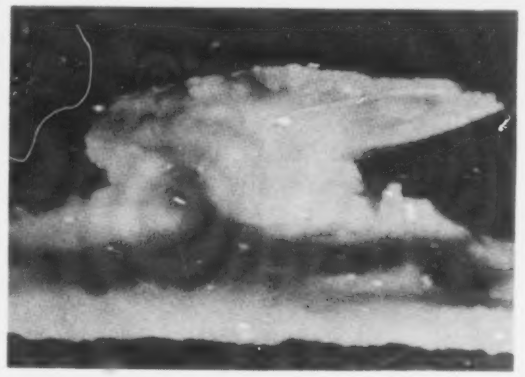
- Passing through strong downdrafts, followed by strong updrafts.
- Heavy rain or hail.
- Frequent and vivid flashes of lightning.
- Precipitation static. (A steady high level of noise in radio receivers, heard as static electricity is discharged from edges of the aircraft. It may also be a visible display such as "St. Elmo's fire.")



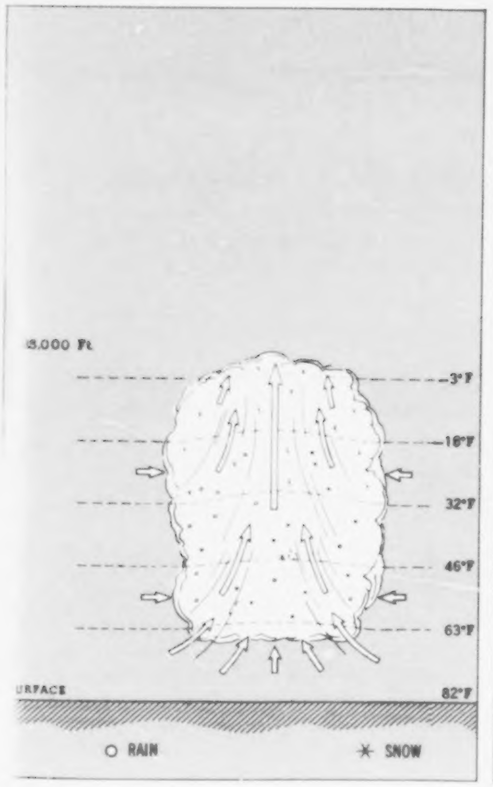
*Cumulus Stage*

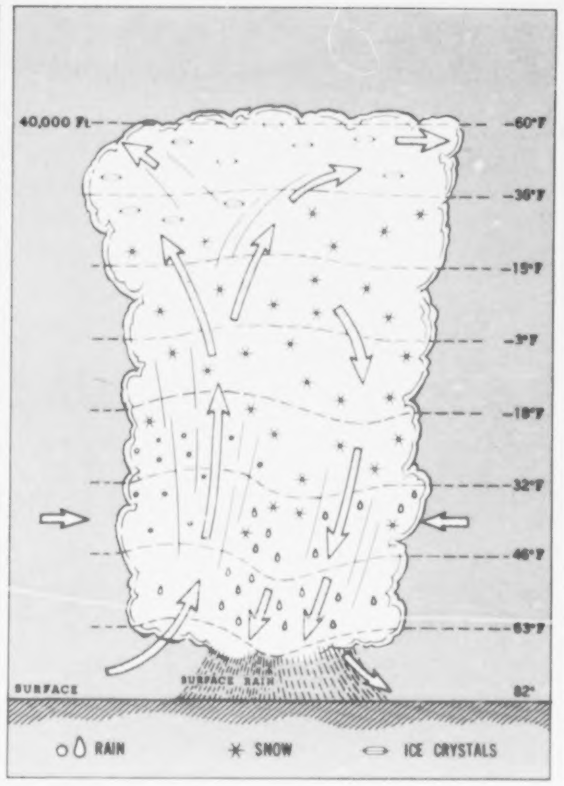


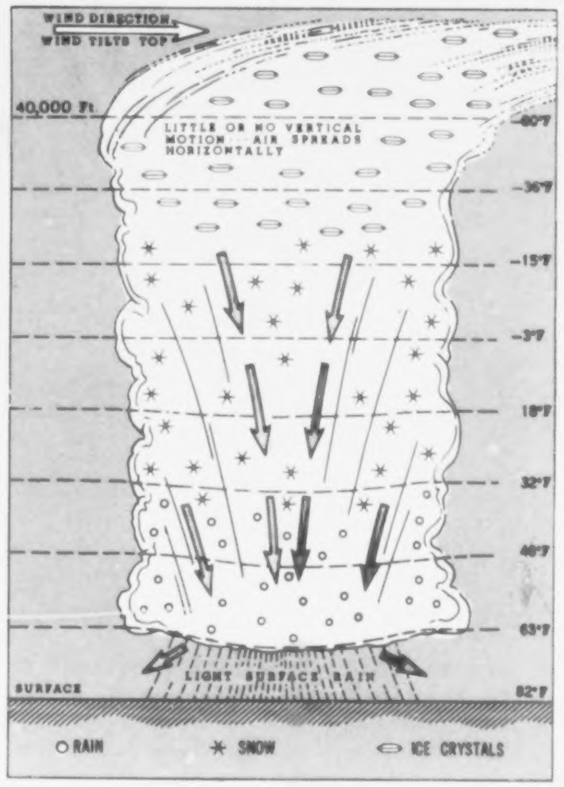
*Mature Stage*



*Dissipating Stage*





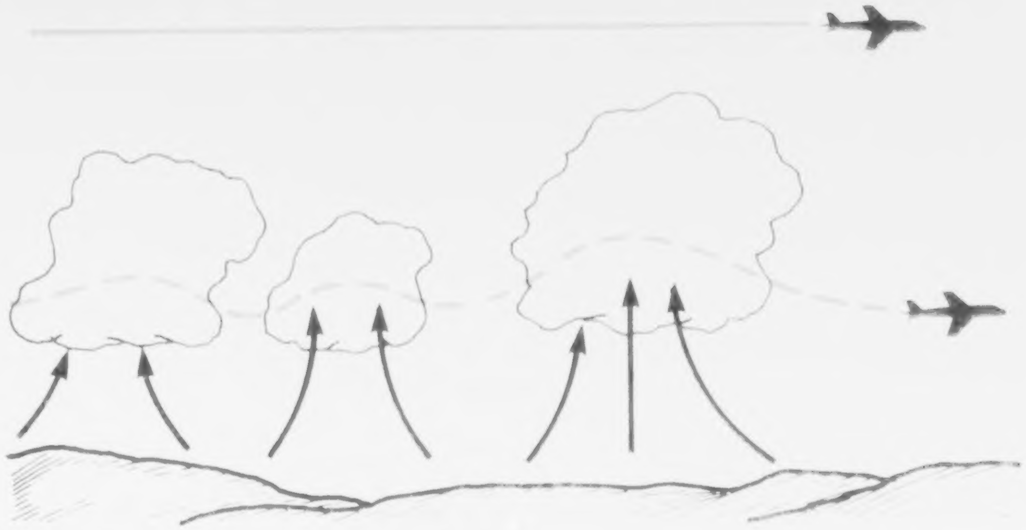


*A rollcloud developing out of a thunderstorm.*

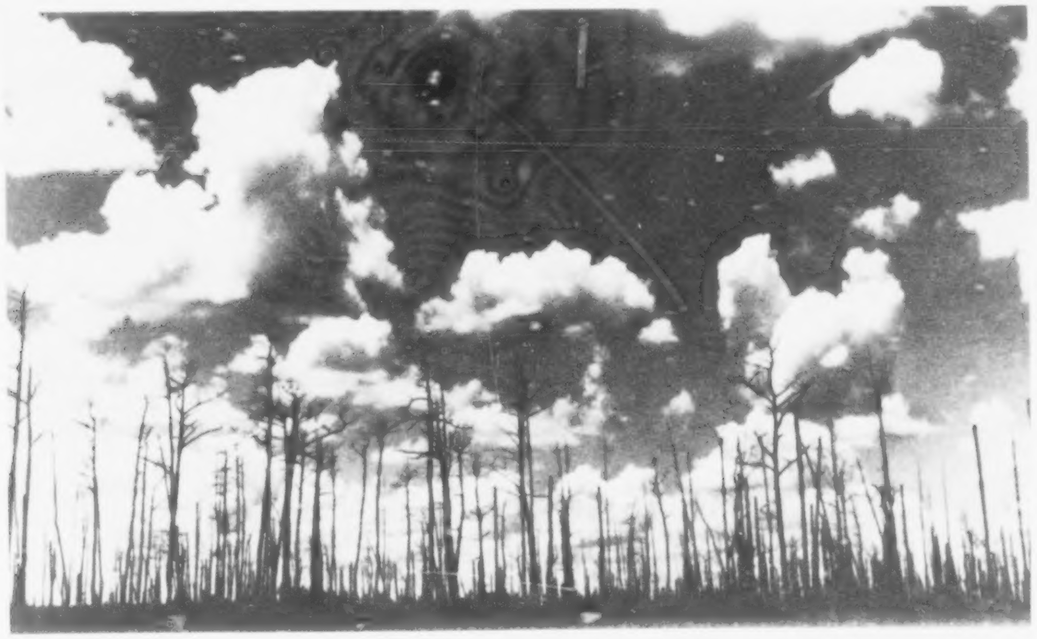
The typical anvil-shaped cloud mass is what we expect to see when we look for a thunderstorm, but often we are not in a position to recognize it; other clouds, or darkness, or haze, may obscure our vision. Although small, widely scattered thunderstorms may appear to offer no obstacle to navigation, these storms could link up to form a thunderstorm *squall line* that is too lengthy to detour.

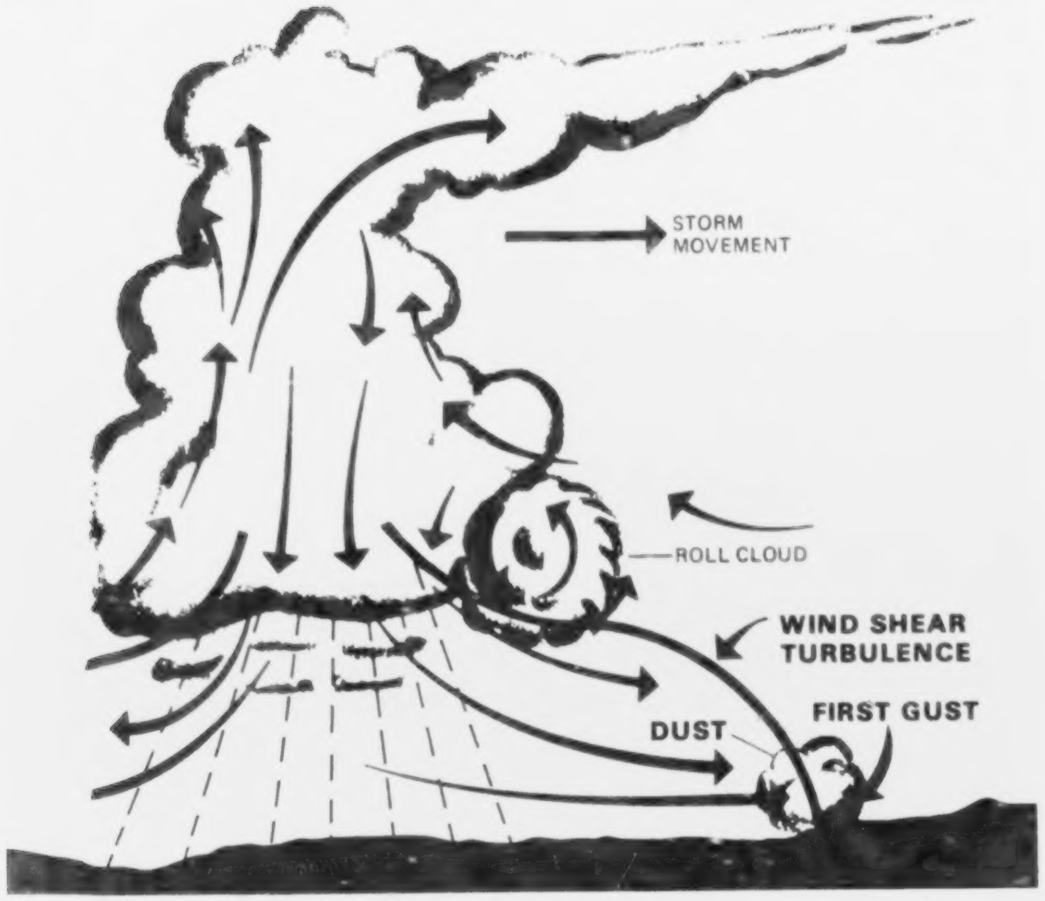
Squall line storms usually form in the late afternoon or early evening, when the fading light may disguise the hazard. At a distance, the squall line may be mistaken for haze along the horizon. Without enroute weather updates a pilot may blunder into the turbulence associated with such storms before there is an opportunity to identify its source.

Instrument pilots sometimes get caught in thunderstorms as a result of overestimating



*Avoid turbulence by flying above convective clouds.*





*Schematic cross section of a rollcloud developing out of a thunderstorm.*

the capability of weather radar. The weather picture shown on any radar screen depends largely upon the position of the radar antenna relative to the storm clouds. The weather derived from a radar antenna located on the ground is by no means necessarily the same picture seen from the cockpit. It is not always possible for air traffic controllers, using even the most effective long-range radar, to lead pilots between storm cells. Furthermore, the storm patterns shown on the ATC radar screen are derived from *precipitation*, not air movement; clear air turbulence is not shown.

The primary purpose of weather radar, either ground based or airborne, is for severe weather *avoidance*, not for searching out safe passageways between adjacent storm cells.

In a light plane, especially, there is going to be little opportunity to navigate, to look for holes, or the "light at the end of the tunnel" once you find that you have entered a thunderstorm. The chances are you will have your hands full trying to maintain a controllable attitude, avoid a stall or upset, or flat-out panic. Any turns you attempt at this stage are likely to increase the risk of structural damage.

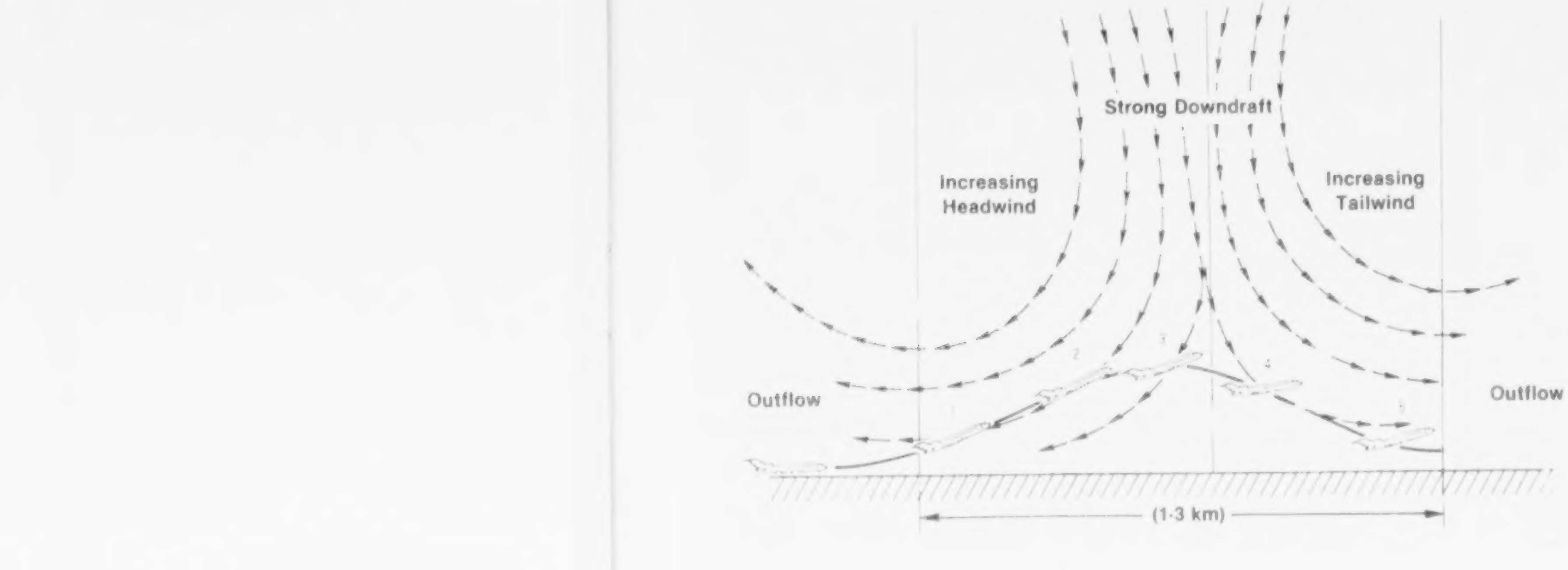
The consensus among weather-experienced pilots is that once within a storm area your safest course is to continue more or less directly ahead until you are at least clear of the turbulence. It may also be safer, from the viewpoint of maintaining structural integrity, to uncouple the autopilot and fly the airplane yourself—however wearisome this becomes; it reduces the strain on the aircraft.

During operations at airports the special kind of turbulence known as "microbursts" can be a severe hazard to aircraft of all kinds, even when the associated thunderstorm is not of great intensity. The microburst, which has been described as an inverted tornado, is a narrow column of rapidly descending air, usually only about one to three miles in diameter, with high velocity downdrafts descending to within a few hundred feet of the surface. Total duration in any particular area may be no more than five minutes. However, the windshear experienced by any aircraft, while in a landing or takeoff configuration, passing through such turbulence can be enough to cause the pilot to lose control and be unable to avert a crash. This is true even of large aircraft: Since 1970 there have been 15 air carrier accidents attributed to windshear and downburst effects of thunderstorms—six of them fatal. The most recent accident of this kind involved a Lockheed L-1011 landing at Dallas/Fort Worth Airport on August 2, 1985; there were 130 fatalities.

Because of the transitory nature of microbursts, their hazards may be avoided in most cases by simply delaying the takeoff or landing until any local storm clouds near the airport have moved on. About 85 major U.S. airports have installed a network of wind sensing devices on the perimeter of the airport. These windshear alerting systems can be very helpful, although as yet they cannot identify or detect *every* type of windshear condition.

Incidentally, a microburst column can extend earthward beneath the clouds for several thousand feet in *clear air*, as the extreme intensity of the downdraft and the dryness of the atmosphere cause moisture to evaporate quickly.

The trick in dealing with any kind of severe weather is to keep as much distance between it and you as possible. ■



*Drawing depicting impact of microburst on aircraft penetrating a strong downdraft core.*

# Chopper Croppers: Rollover

Summertime usually brings on a flurry of helicopter activity in remote and often mountainous recreational country—and sometimes as well an increase in the number of accidents involving a phenomenon known as "dynamic rollover." (Although a helicopter may be equipped with skids, wheels, skis, or floats, this article discusses only the skid-equipped helicopter.)

Dynamic rollover occurs when a helicopter rolls over to one side or the other while attempting to operate on sloping or uneven terrain. As a matter of fact, the rollover may take place on fairly flat ground, if there is some projecting object against which a skid can become lodged.

During a vertical takeoff to a hover or landing from a hover with one skid on the ground, if you allow or cause the aircraft to pivot (roll) around that skid, or attempt to move vertically before leveling the skids, you may find yourself in a situation which, if not promptly checked, can progress beyond the point of recovery. Several factors increase the likelihood of a rollover occurring:

1. Right skid downslope or downwind (for most U.S. built and other helicopter whose main rotor blade turns clockwise as viewed from beneath).
2. Center of gravity loads displaced toward the downslope skid.
3. Crosswind from the side opposite the downslope skid.
4. High density altitude.
5. Maximum gross rotor weight.

With clockwise rotating main rotor blades the thrust force of the tail rotor is slightly more effective against the right skid than the left skid. The other four factors are largely self-explanatory as regards their contribution to reduced control. Whenever any of these conditions prevail, hovering with one skid touching the ground should be done with care.

## Slope Landing or Takeoff

*Above—Moving cyclic control downslope as a means of keeping skids parallel to slope may result in downhill rollover. Right—maintaining rotor blade plane parallel to horizon with cyclic helps keep helicopter in balance during takeoff and landing.*

It is important to keep the helicopter cyclic control trimmed, if equipped with force trim or force gradient especially laterally. If a slow takeoff is attempted and the tail rotor thrust contribution to rolling moment is not properly compensated for, the critical recovery angle may be exceeded in less than two seconds.

To retain control at all times, the bank of the main rotor tip path plane and the control input rates must be moderate. The helicopter should be flown vertically into the air smoothly, with changes in pitch, roll, and yaw kept to a minimum.

**LEVEL GROUND OPERATIONS.** Dynamic rollover may occur on level ground whenever, through side drift or angle of bank, a skid is allowed to come into contact with any obstruction. The obstructions can be as varied as a clump of grass, a rock outcrop, a tree stump, a refueling hose, etc. Even soft ground may contribute to roll if the landing gear is allowed to sink into it.

Whenever only one skid is in contact with the ground, use the flight controls carefully to prevent excessive bank.

**SLOPE OPERATIONS.** The approach to a slope is similar to the approach to any other landing area. During slope operations, allowance must be made for wind barriers and forced landing sites in case of engine failure. Since the slope may constitute an obstruction to wind passage, turbulence and downdrafts must be anticipated.

Usually, a helicopter should be landed on a *cross-slope* rather than on an upslope. Landing downslope or downhill is not recommended because of the possibility of striking the tail rotor on the surface.

Follow published procedures for your make and model of helicopter. The Pilot's Operating Handbook should also be consulted to determine the degree of slope that can safely be accommodated without reaching control limits. The area of critical rollover will vary considerably for different makes of aircraft—depending on vertical and lateral center of gravity, landing gear configuration, tail rotor thrust, etc.

When taking off with the helicopter facing across a slope, roll problems may develop if the main rotor disk is not maintained nearly parallel to the horizon at all times. If the rotor disk inclines toward the downhill skid (i.e., becomes parallel to the slope), the downhill skid may become lodged in the ground and conditions for a downhill roll may be created. If you attempt to dislodge that skid by tilting the main rotor disk toward the *uphill* skid, during liftoff the helicopter could roll over upslope. If you have a problem with raising the downhill skid while maintaining proper cyclic control, it may be appropriate to shut down and check to see whether the skid has become entangled with a root or other obstacle. Accept nothing less than a *vertical* ascent with an essentially level main rotor disk; do not overcompensate with the cyclic control.

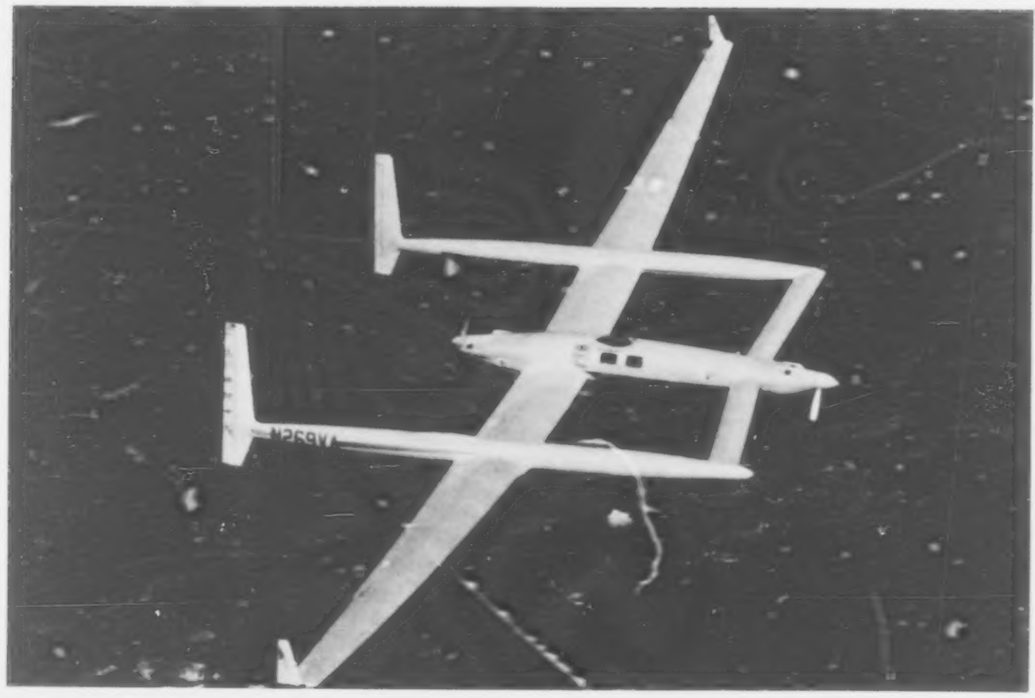
***If passengers or additional crew members are picked up or off-loaded after landing, the lateral cyclic and trim requirements may change and must be re-evaluated before lifting off.***

Before landing it helps to study the combined effects of slope gradient, wind, load position, and apparent soil stability and freedom from impediments. The landing maneuver is virtually a reverse of taking off when facing across a slope: main rotor disk is held level, uphill skid touches down first, downhill skid is lowered smoothly to the surface.

Downhill rollovers are sometimes initiated by pilots who find they have reached the limit of cyclic control without being able to set the downhill skid on the ground—and attempt to do so by reducing collective excessively. This ill-advised procedure may lead to rotor blades striking the ground, damage to the mast or hub from mast bumping, and/or rollover. The appropriate response is to return to a hover and select a less steep area of the slope. (A slope of five degrees is considered maximum for normal operation of most helicopters.) Each make of helicopter will generally have its own peculiar way of letting the pilot know when the lateral cyclic travel is about to run out—the rotor hub may start bumping against the rotor mast, vibrations may be felt through the cyclic stick, etc.

A common error when landing a helicopter on a slope is failing to maintain normal operating rpm as the collective is lowered. If the rpm is allowed to decay before the full weight of the aircraft is on both skids, the pilot may not be able to perform an immediate liftoff if the machine starts to slide down the slope or shows a tendency to roll. Another frequent error is failing to use the pedals to keep a constant heading across the slope. This complicates the problem of establishing firm ground contact with both skids.

Note: Except in an emergency, landing or takeoff should not be attempted on a slope with the wind at your tail, as this will make it more difficult to hold your heading. ■



**PAPER CHASE:** An aircraft built of resin-impregnated paper and graphite fibers will attempt a record-setting nonstop, non-refueled flight around the world on or about September 14, 1986. The twin-engine "Voyager," whose two-person crew will be crammed for some 12 days into a cockpit less than two feet wide, with sitting room for one only, is currently carrying out a practice flight of six days nonstop over the west coast.

## FAA Leaders Offer Seminars at Oshkosh

Pilots who visit the annual EAA fly-in convention in Oshkosh, WI this summer will have an unusual opportunity to discuss flight problems with top leaders of the Federal Aviation Administration in person. From August 1 through August 8 the FAA forum tent will present a continuous series of seminars on virtually all phases of flying and aviation safety—as well as medical facts for pilots, flight standards and air traffic regulatory issues.

Highlight of the convention will be a frank "Meet the Boss" session on August 4 with Administrator Donald D. Engen. On August 5 Federal Air Surgeon, Dr. Frank Austin, will talk with pilots about disqualifying medical factors and how to re-apply for medical certification after being disqualified.

For a complete schedule of FAA seminars contact Gary D. Koch, national coordinator of the Accident Prevention Program (202-425-8214) or the EAA information office (414-426-4800). All fly-in visitors, including pilots of ultralights and non-radio equipped aircraft, should consult the special air traffic procedures in the July 3 "Notice to Airmen" publication of FAA, available at flight service stations.

## Medical Review Urges Changes in Certification

The aviation community is invited to comment on the recently published "Review of the Medical Standards for Civilian Airmen," carried out by the American Medical Association at the request of FAA.

This extensive report reviews the entire FAA medical certification process, and proposes certain changes intended to bring that process into closer alignment with recent advances in prognostic testing.

Inasmuch as the bulk of the civilian airman population is in the middle age male category, new emphasis was recommended for tests with a significant predictive value for such persons. For example, routine electrocardiagrams would be administered for all classes of medical certificates; safe levels of cholesterol would be established and checked; a psychological test for mental sharpness would be devised; instrument pressure testing for glaucoma symptoms would be required, etc.

A ten page synopsis of AMA's review is available free from Alan J. Engelberg, M.D., Dept. of Public Health Policy, AMA, 535 N. Dearborn St., Chicago, Ill 60610 or from FAA, AAM-200, 800 Independence Ave., SW, Washington, DC 20591. The full report may be ordered from the National Technical Information Service, Springfield, VA 22161. Send a check for $37.70, payable to the Treasurer of the United States. Stock number is AD A166 464 for Volume I and AD A166 464 for Volume II.

Deadline for comments on the AMA review as a basis for possible rulemaking changes is August 21, 1986. Please send comments in duplicate to FAA, Chief Counsel, Attn. Rules Docket (AGC-204) Docket No. 23190; 800 Independence Ave., SW., Washington, DC 20591.

## LATEST AIRMAN PUBLICATIONS

### New Weather

A description of changes to various weather services provided to pilots by the National Weather Service can be found in the updated advisory circular, "Aviation Weather Services." AC 00-45C may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 for $6.00. Check, money order, or credit card is acceptable; specify stock number 050-007-00705-1.

### Airworthiness Directives

Advisory Circular 39-6L, just released, describes the availability of bound volumes (both hard back and paperback) of all FAA-issued Airworthiness Directives. Microfiche copies may also be ordered. Complete ordering directions and price information may be acquired by writing for a free copy of this AC to: DOT Subsequent Distribution Section, M 494.3, Washington, DC 20590.

**WINGS OF AN EAGLE:** Medieval airman soars from castle wall in new large screen film on the history of natural and mechanical flight, "On the Wing," showing this summer in Smithsonian Air and Space Museum in Washington, D.C.

## Cruise Clearances

*I would like clarification on a point of substantial dissention among my local group of flight instructors and fellow pilots.*

*Most people say that all altitude changes made within the limits of an IFR clearance must be verbally reported to ATC as per AIM Para. 342(a)(1)(a). As a result, the first time you leave one altitude for a lower one, you cannot return to that higher altitude without further ATC clearance.*

*My contention is that discretionary altitude changes within the limits of a cruise clearance are not changes from one assigned altitude to another assigned altitude, and therefore AIM 342(a)(1)(a) does not apply and no verbal report is required.*

*I contend that a pilot on a cruise clearance may vacate an altitude for a lower one and then return to that higher altitude (or an even higher one as long as it is within the cruise limit) as often as he desires as long as he doesn't issue a verbal report of leaving the higher altitude. Once you do make that verbal report of vacating an altitude for a lower one, you are then prevented from climbing above that lower altitude without additional ATC clearance.*

*Am I right, or need I bow to the wisdom of the majority?*

*Charles R. Flanagan*
*Scotts Valley, CA*

Right as rain. We agree with you completely.

## [illegible]

*The photo that accompanied John Doster's article in the March/April issue (Ten Cent Repair Kit) looks a lot more like a Fairchild-24 to me than a Piper Pacer.*

*Phil Cramer*
*Dallas, TX*

Right you are. Our mistake—not John's—in editing the material. Thank you for the observation.

## [illegible]

*I object to the FAA policy that prevents me from having an operating manual for my calculator with me while I am taking an airman written test. What's the statutory authority for this decision?*

*Name withheld*

Federal Aviation Regulation §61.37(a)(5), states that no person may use any material or aid during the period when a test is being given except as authorized by the Administrator.

Operation booklets or manuals accompanying electronic or mechanical calculators sometimes contain information not directly related to the operation and use of the calculator. This information may pertain to subjects in the test items in FAA written tests. For this reason, such manuals may not be used during a written test.

In order that applicants for airman written tests may use scales, straight edges, protractors, plotters, navigation computers, and electronic or mechanical calculators while taking written tests, information not pertinent to the actual operation of the aids mentioned must be masked out by the applicant. Such information includes: FAR's, signals, cloud data, holding pattern diagrams, frequencies, weight and balance formulas, ATC procedures, etc.

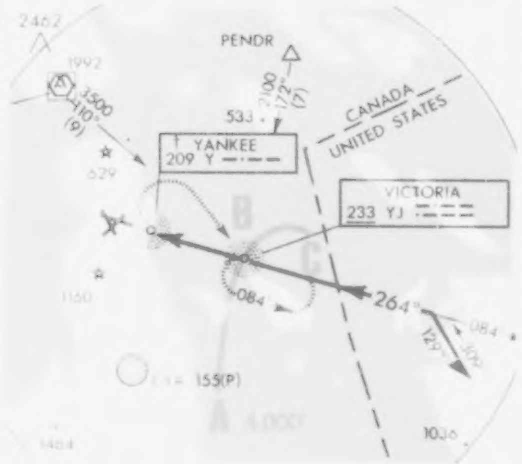
Finally, while the use of electronic or mechanical aids is permissible as outlined above, it is the responsibility of the applicant to know how to use such aids.

## Outward Bound

*I have a question about an NDB approach at Victoria, BC, Canada, and I would like to know if the answer applies to similar approaches in the USA.*

*If at Position A you are 4,000 feet cleared direct to YJ beacon for the NDB-26 approach, may you upon crossing the YJ beacon (Position B) begin your descent to 2,100 feet or must you wait until established on the outbound crossing (Position C) before leaving 4,000 feet?*

*John Caruso*
*Richmond, BC, Canada*



We must refer you to Transport Canada's Regional Headquarters in Vancouver, BC, or National Headquarters in Ottawa for the answer on Victoria. If this were an approach in the United States, you would be required to wait until established on the outbound course (Position C) before leaving 4,000 feet.

**FAA GENERAL AVIATION NEWS** welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.

## ELT Signal Monitors

*A great deal has been written about ways to avoid false ELT signals. I have some suggestions, but no idea to whom to address them. Here they are.*

*The first would be to require that a small LED be mounted on the aircraft's exterior and this LED would illuminate when the ELT has been activated. This would help to solve the problem of trying to locate an activated ELT among the many parked planes at an airport.*

*The second idea is somewhat more complex. If ELT's could be designed to give an audible signal within the airplane for the first 15 to 30 seconds of activation and then automatically switch themselves off, this would certainly get the pilot's attention. Another possibility would be to mount an LED annunciator in the instrument panel so that the pilot would have a visual indication of ELT operation.*

*Bennett E. Taber*
*Anchorage, Alaska*

Interesting ideas. However, LED's produce a significant battery drain and could affect battery life. Audio signals and cockpit LED annunciators would require a new Technical Standard Order, and lead to a significant increase in purchase costs.

The simplest way to prevent unintentional ELT activation is for the pilot to routinely tune his VHF radio to 121.5 during shutdown, and listen for the warning.

# INSTRUMENT CORNER

## Below MEA/MOCA Altitudes

*While on an IFR flight plan on a Victor airway, I have been assigned an altitude as low as 2,000 feet below the MEA by a radar approach control facility. The segment of the airway that I was on had no MOCA listed and my position was approximately 10 miles from the VOR I was enroute to. I asked the controller if this altitude assignment would be for radar vectors and he replied, "Negative, fly the airway." I was not given any lost communications instructions and reluctantly I descended to the assigned altitude.*

*I believe that if I am to "fly the airway" I am responsible for both terrain clearance and for radio navigation reception. The only way I can be assured of meeting this requirement is to fly at or above the MEA or MOCA when within 25 statute miles of the VOR. I also believe that FAR 91.119(a)(1) requires me to fly at or above the appropriate minimum altitude for that segment of the airway. I also reference that Airman's Information Manual paragraph 401(b)(2) and FAA Handbook 7110.65D paragraph 4-44(a) which indicate that this type of operation is not a proper operating practice. If I am incorrect in my belief, please provide me with a specific reference which indicates this procedure is authorized in a radar environment.*

*Corey J. Ferguson*
*Mission Viejo, CA*

Without knowing the identity of the airway in question, it is difficult to provide you with a specific answer as to the propriety of the controller's direction. FAR § 91.119 does allow for IFR operation below an MEA, but only where a MOCA is also published for this segment of the airway. A controller may also vector an aircraft at an altitude below the MEA or descend an aircraft to an initial approach altitude which is below the MEA.

If you as pilot in command feel at any time that a controller advisory would create unsafe circumstances for you, you should so inform the controller immediately and, if necessary, maneuver the aircraft in the manner you deem necessary for safety. In this event you should keep ATC informed of what you are doing, and be prepared to justify your actions fully.

Any questions you have over such an incident should be taken up with the facility manager as soon as possible, in order to have access to voice tapes of the actual transmission. These tapes are routinely erased every 15 days, unless otherwise requested.

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(continued from page 7)

That same year also brought standardization. The centers had been operating on a trial and error method of equipment construction. By using the best features of each center, a composite was devised for all future centers, beginning with Hoover Airport (now the site of the Pentagon) in Washington, DC.

It is now 50 years later. The world of aviation aircraft and equipment has advanced to resemble things imagined by science fiction writers. Flight regulations and procedures have also changed to reflect these advancements, as has the ATC system. When the system started, it was mainly used during bad weather, as air carriers and the military could operate VFR at will when weather permitted. It would not be until after World War II that more emphasis would be placed on all weather operation and positive control. Fortunately, technology for direct radio communications, recording equipment, and long range radar had advanced enough to make the system more efficient.

Today there are some 14,000 air traffic controllers working at approximately 400 airport towers and 23 air route traffic control centers across the U.S. When compared to the original 15 controllers at five control towers, and later three airway control stations, air traffic has come a long way and is still growing. There is still one thing they have in common—to make the skies a safer place to fly. ■

*Home free...*
*or right over*
*home plate?*

FAA
# general aviation NEWS
SEPTEMBER—OCTOBER 1986
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**Federal Aviation
Administration**

# FAA GENERAL AVIATION NEWS

**SEPTEMBER/OCTOBER 1986**
**Volume 25, Number 5**

Elizabeth Hanford Dole, *Secretary of Transportation*
Donald D. Engen, *Administrator, FAA*
Anthony J. Broderick, *Assoc. Admin., Aviation Standards*
John S. Kern, *Director, Flight Standards*
Carol S. Rayburn, *Manager,*
*General Aviation and Commercial Division*
Gary D. Koch, Sr., *Manager,*
*Accident Prevention Program Branch*
David Gelfan, *Editor*
P. A. Duncan, *Associate Editor*
Louise Oertly, *Associate Editor*

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## BRIEFS

MOGAS. Pilots using automotive fuel in aircraft for which the appropriate supplemental type certificates have been obtained are cautioned about accepting such fuel if it has been in long term storage above ground and exposed to high temperatures. These conditions are conducive to gum formation, which may lead to engine malfunction.

Testing at FAA's Technical Center also indicates that carburetor icing will occur in less time and at higher ambient temperatures with automotive gasoline than with Avgas. Further, it is recommended that for aircraft fueled with autogas the availability of full power should be determined before takeoff, if the aircraft is heat-soaked from a strong summer sun or from hot-day ground idling.

REDEYE PROBLEMS. Red interior lighting can create a problem at night for pilots over 40. Inability to focus well on instruments or charts (i.e., near vision) in red light is an early form of weakening visual acuity, which may occur while the individual still has no difficulty focusing in white light. For this reason some aircraft manufacturers are changing from red interior lighting back to white.

WANTED: A FEW GOOD PERSONS. Beginning September 2, 1986 and continuing indefinitely, FAA is opening its register to hire aviation safety inspectors at the GS-9/11/12 level. Positions to be filled are general aviation and air carrier operations inspectors, general aviation and air carrier airworthiness inspectors, avionics airworthiness inspectors, and manufacturing inspectors. If you think you might be qualified or are interested, write to DOT/FAA, Mike Monroney Aeronautical Center, ATTN: AAC-80 (GAN), P. O. Box 25650, Oklahoma City, OK 73126. Ask for announcement #FAA/ASI-005, which will provide all the information you need to apply. Good luck!

PASS IT ON. As much as we know that no one can stand to be parted from a copy of FAA GENERAL AVIATION NEWS, try passing your issue on to less fortunate pilots. You can xerox articles you wish to keep, but if "spreading the wealth" is too much for you to bear, at least pass on the subscription form. Thanks, and read on!

# GROUNDCOLLISIONS

## These "earthly" mishaps also require pilots to see and avoid

Midair collisions and near midair collisions between aircraft understandably receive the most attention from safety-conscious pilots and accident investigators. However, ground collisions between aircraft and between aircraft and other vehicles can and have resulted in serious injuries and significant aircraft damage. A review of the National Transportation Safety Board (NTSB) data for 1984 shows that there were a total of 33 aircraft accidents involving ground collisions.

While 33 accidents with only one fatality may seem an insignificantly small portion of total accidents, consider these figures: About 24 percent of these accidents involved collisions between two moving aircraft. In most of these cases, the pilots were aware of each other's presence. Approximately the same percentage of accidents involved collisions between moving aircraft and moving ground vehicles, again, where the pilot was aware of the location of the vehicle in most of the cases. Thus, in nearly half of the total 33 accidents, aircraft—containing passengers—were taxiing on ramps with the usual mixture of traffic to be found there; however, ordinary circumstances led to extraordinary accidents.

Only about six percent of the total ground collisions involved aircraft striking an obstruction other than another aircraft or a vehicle, but over one third occurred when an aircraft—usually one being improperly hand-propped—taxied into another, stationary aircraft.

A typical example involved a Cessna 150 that had stopped on a taxiway at an uncontrolled airport so that an instructor could deplane for his student to conduct a supervised solo. As the instructor was exiting the aircraft, the Cessna was struck from the left rear by a taxiing North American T-6 Trainer. Neither pilot saw the other before the collision. Fortunately, no one was seriously injured, but the stationary Cessna was substantially damaged. The Safety Board determined that the visual lookout of the T-6 pilot was inadequate.

After examination of the accident data and this example in particular, a reasonable individual might wonder, "Who's minding the store?"

Since many of the ground collisions took place while the aircraft and vehicles were under Air Traffic Control (ATC), it is obvious that, as with airborne collisions, contact with ATC does not automatically guarantee that you will not suffer unexpected and unwanted contact with a solid object.

What precautions can pilots take to prevent these "non-scheduled events?"

First and foremost, just as in the air, use your eyes, and look for other traffic. *There is no substitute for an alert, vigilant pilot.* Most of the accidents in this particular sample were attributed to pilot inattention and simple misjudgement of clearance distances. At least one case involved a collision where the taxiing pilot had a limitation on his medical certificate to wear glasses while exercising the privileges of his airman certificate. For some reason he was not wearing his glasses, and his airplane hit a parked truck whose position the pilot was aware of. The Safety Board found that a factor relating to the accident was the pilot's failure to wear the necessary corrective lenses.

Second, know your wing-tip clearance. A significant number of these ground accidents were caused by pilots' not maintaining adequate wing clearance. The pilots in these cases thought they could make it around the offending obstruction—they did not. Very few human injuries resulted, but insurance companies do not appreciate—and you will not either when your rates go up—this sort of highly preventable accident.

Third, use your ears, too. The NTSB attributed several accidents to pilots who had not followed both *verbal and written instructions* from ATC. At a recent airshow, a "Warbird" pilot who disregarded a controller's instructions taxied into another "Warbird's" rudder, causing substantial damage to both aircraft. Strict adherence to taxi instruction is just as important as following an airborne clearance to the letter; both help prevent collisions.

Fourth, pilots should also read and heed NOTAM's. Aircraft/vehicle collisions have occurred on airports during snow removal operations and airport construction. These events are NOTAMed when they affect aircraft operations on an airport. NOTAM's alert pilots to conditions requiring extra vigilance. (See the January/February 1986 issue of *FAA General Aviation News* for an article on the types of NOTAM's and their dissemination.) A prudent pilot should recognize that NOTAMed conditions, such as snow removal operations and airport construction projects, could mean that untrained personnel are operating equipment and construction vehicles on pavement areas used by aircraft. Looking out for ground personnel increases the responsibility of the pilot, but the definition of pilot-in-command (responsible for the operation and safety of an aircraft) includes looking out for anything or anyone posing a potential hazard. In short, be informed, alert, and aware of any person or thing on an airport.

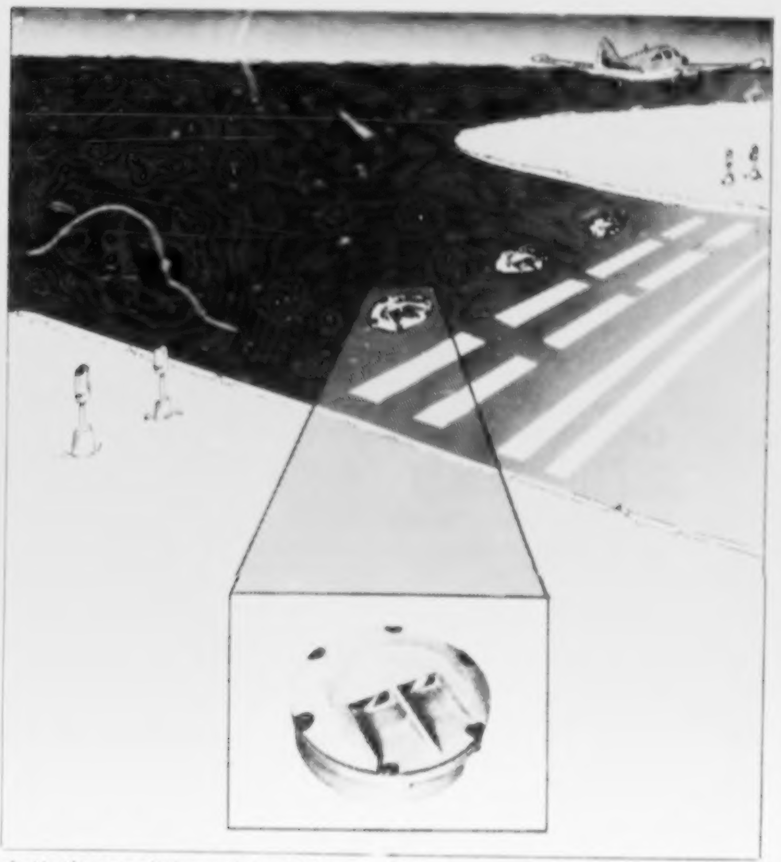
One important precaution a pilot can take before taxiing or arriving at an unfamiliar airport, is to learn the airport layout from approach plates, taxi charts, and airport surface layout plans. The layout plans may often be available at the airport operations office, or you can find pictorial descriptions in some commercial publications. If you have none of these, you can always ask ground control at tower controlled airports for "progressive taxiing" instructions or request line assistance over UNICOM at uncontrolled airports. If no such assistance is available in the latter case, proceed slowly and cautiously. In either instance do not hesitate to call on your passengers to use their eyes as well, remembering, of course, that you are the final authority and yours is the ultimate responsibility. A good operating practice is to monitor the assigned ATC frequency after clearance onto an active runway for departure and until flight from the airport traffic area is completed, or after receipt of a landing clearance until after landing and crossing all active runways.

It is in your best interest to familiarize yourself with the FAA standard airport pavement marking and lighting systems. (The March/April 1981 issue of *FAA General Aviation News* contained a comprehensive article on airport markings.) Particularly, learn to recognize taxiway/runway hold line and taxi line markings: More than one ground collision accident has been the result of an inadvertent entry onto a runway by a pilot who was unsure of what the taxiway hold line markings meant.

Since some of these airport accidents can be attributed to the operators of ground equipment, what are airports themselves doing about preventing vehicles under their responsibility from colliding with moving or stationary aircraft? One way, of course, is through vehicle operator training. Even though the FAA has no data, most large and many smaller airports have a comprehensive initial and recurrent training program for airport ground equipment operators. Many airports also require that a properly trained airport employee monitor the airside ground movements of any equipment operator who has not had training in airport operations.

As an aid to try and prevent any unauthorized aircraft and vehicle runway incursions at John F. Kennedy International Airport, the Port Authority of New York and New Jersey and the FAA will soon be evaluating a test system of "traffic lights" for taxiing aircraft and ground vehicles. The system, controlled from the tower, will consist of a series of green and red in-pavement and edge lights located at the runway hold lines.

Cont. on back cover



*Artist's rendition of hold line lights to be installed at JFK.*

## FAMOUS FLIGHTS

# STAR TREK

*This issue's Famous Flight is somewhat of a departure from our usual fare. It is not about an actual flight but rather a flight of the imagination which became very real to a generation of television watchers. In fact, this article celebrates the 20th anniversary of that flight. In the May/June issue we delved 100 million years into the past with "QN—The Time Traveler." This issue we go forward in time to the 23rd Century to . . .*

*". . . Space, the final frontier. These are the voyages of the Starship* Enterprise, *her five-year mission to explore strange, new worlds, to seek out new life and new civilization, to boldly go where no man has gone before."*—Ed.

**On September 8, 1966 at the beginning of a new television season premiered the brainchild of a rather modest-appearing writer-producer. In the early 1960's he had become well-known in Hollywood for a number of conventional television series, *West Point*, *Have Gun, Will Travel*, and *The Lieutenants*, to name a few. However, his new show was entirely different, for it was not his version of a studio or network idea; it had been his dream for nearly 20 years. The man was Gene Roddenberry, and his television show, billed as the first serious science fiction on TV, was *Star Trek*.**

**The seeds of *Star Trek* were planted in Roddenberry in the late 1940's when he was a pilot for Pan American World Airways. On the New York to Calcutta run, he would look down on the earth from the cockpit of his DC-4 or "Connie" and think about flying among the stars. The camaraderie that evolved among the Pan Am flightcrew on the long (8,000 mi.) trip made him wonder about what a "space airliner" would be like. Roddenberry began putting these thoughts down in the form of science fiction short stories which he sold to a number of aviation magazines.**

**Dissatisfied with the life of an airline pilot, Roddenberry left Pan Am in 1949 to become a Los Angeles City policeman—specifically L.A. so he would be close to Hollywood and able to sell his growing stack of scripts. He continued to write for magazines and television and served as a consultant for cop shows. In the late 1950's he left the police department to work full time as a scriptwriter and eventually producer. In 1964 his studio, Paramount, asked him to come up with a new series concept to replace *The Lieutenants*, which was about to be cancelled.**

**Roddenberry's concept was the "Horatio Hornblower in space" or "Wagon Train to the stars" idea he had dreamed up while flying to Calcutta. The show would have a stalwart, resourceful captain, a loyal first officer, a crusty ship's surgeon, and a Scottish engineer, as well as several other supporting characters. The spaceship would be a vessel of peace equipped to wage war when necessary. The ship and crew were emissaries from an Earth that had solved its social, economic, and ecologic problems. *Star Trek's* message would be one of peace, brotherhood, and hope for the future.**

**The idea was sound although studio executive worried it would be too highbrow for the average television viewer, who was typically more interested in action than philosophy. Indeed, it took two pilots before a network (NBC) would buy the show, provided Roddenberry got rid of "the guy with the ears."**

**This referred, of course, to Spock, a half-alien, half-human science officer, played by stage actor Leonard Nimoy, who was the Captain's "second." He turned out to be popular with the viewers, and the network recanted. The Captain was James T. Kirk (Canadian actor William Shatner), brave, handsome, resourceful, or, as Roddenberry said, "The kind of airline captain I wish I had been." Dr. Leonard "Bones" McCoy was the Captain's confidante, a highly proficient medical doctor with a healthy mistrust of anything too scientific. He was portrayed by character actor Deforest Kelley. The fourth of the main characters was Scotty, the Chief Engineer who referred to his engines as his children and whose brogue was thick as shoe leather. James Doohan, actually a Scot and a master of accents, played Scotty.**

# The Five-Year Mission 20 Years Later

The crew (l. to r.): Sulu, McCoy, Uhura, Chekov, Kirk (seated), Scotty, Saavik (from the second movie), and Spock.

The ship: Battle-scarred *Enterprise* before her demise in *Star Trek III*.

The remainder of the secondary characters were comprised of a black woman (Uhura, acted by Nichelle Nichols, who went on to recruit for NASA) with an important position in the line of command, an oriental helmsman (Sulu, acted by George Takei, who briefly went into California politics), and a Russian navigator (Chekov, acted by Walter Koenig, who now does stage plays). Last but not least was the comely ship's nurse (Christine Chapel, played by Roddenberry's wife, Majel Barret; she also recorded the voice of the ship's computer), desperately in unrequited love with the logical, unemotional Spock.

In a time of racial and political strife people could—and did—tune to this program and be assured we were going to survive nuclear and ecological disaster and achieve a world where everyone was truly treated equally. *Star Trek* was a good dose of much-needed optimism at a time when people were pessimistic about the survival of the human race.

Even today nearly two decades after it left the air, that message continues to be heard. *Star Trek* the television series was cancelled in 1969, but the concept, the hope it represented lives on. There have been three successful motion picture films aired and dozens of novels written. Fans, old and new (some born *after* the program was cancelled), flock to conventions to see episodes they have already seen countless times and to hear the series' stars speak. The program is one of the most widely syndicated in the world. *Star Trek* is a phenomenon that will outlast the generation of baby boomers who first made it popular.

Representative of the optimism of *Star Trek* were the hope and aspirations of the Space Shuttle Transportation System. In 1978 when the prototype shuttle for the approach and landing tests was rolled out of the assembly plant, it was christened *Enterprise* by the *Star Trek* "crew." (*Enterprise* is currently "space-docked" at Dulles International Airport near Washington, D.C. awaiting construction of an Air and Space Museum annex. The "original" *Enterprise*, the model used in filming, is already housed in the Smithsonian's Air and Space Museum.)

We can apply *Star Trek's* message of hope to the plight of general aviation today: we should not let high costs of fuel and instruction, dwindling production and sales of general aviation aircraft get us down. There will be a day when pilots will find themselves flying routinely to orbit to jobs and homes and, eventually, between planets instead of cities. In the future there will always be a need for all kinds of pilots and aircraft, and we will get there.

*Star Trek* was and is that sort of inspiration, an ideal future to aspire for. Many of today's pilots (this writer included) took to the skies to make that possible future a reality. (Both William Shatner and Leonard Nimoy are pilots, as was Roddenberry.) The future that *Star Trek* represents is something we can all aim for. Its characters, its concepts are as much aviation and space pioneers as Lindbergh or Yeager or Glenn.

In the most recent movie, *Star Trek III: The Search for Spock*. The *Enterprise*, the symbol of future hope, was destroyed, but there was a promise of rebirth for the *Enterprise*. The hope never dies. That is a lesson all of us, in view of the *Challenger* disaster, need to remember. The *Enterprise* will live again in our dreams and imagination; aviation will continue to foster that imagination; and our space program will recover to take us to that final frontier.

So, Happy Anniversary, *Star Trek*, and thanks for inspiring us to the skies and beyond.

Beam us up, Scotty! ■

# THE WHY OF WEATHER ACCIDENTS

## . . .after all is said and written it may simply be ignorance . . .

If there is one conclusion that can be drawn from this business of aviation safety it is that the basic causes of aircraft accidents are seldom unique or different. For example this past year and so far in 1986, numerous pilots have again fallen victim to the same old, so-called "weather accident." In spite of the reams of paper that have been consumed on this subject and the thousands of spoken words delivered at innumerable safety meetings across the country, the grim reaper continues to take his toll in "bad" weather.

Why do pilots continue to become involved in weather situations beyond their capabilities? Is it because of *ignorance? Overconfidence?* Or because they *think* they must be somewhere at a given time? It has become an accepted fact among accident investigators that some pilots will fly into almost any kind of weather for relatively unimportant reasons. If you have been flying for any length of time at all, you probably have done the same at one time or another. The difference is that nothing has happened to you—short of a few more grey hairs and a prominent pucker mark in the left seat. Nothing has happened to you—*yet*.

We have all heard the various preventive measures necessary to avoid a weather accident: check the weather, make conservative decisions, use all available sources of information, etc. Not to be derogatory, but we did mention *ignorance* as a possible factor in weather accidents. It is becoming ever more apparent that there are pilots who do not fully understand the hazards of attempting to fly VFR in conditions where visibility is reduced by rain, sleet, drizzle, fog, etc. The ignorant act of flying VFR on top, *at night*, has figured in more than one weather accident. It is also evident from studying the reports of several fatal weather accidents that a majority of the pilots involved mistakenly believed that prevailing weather conditions, although marginal, were sufficient to conduct a safe VFR flight. (Really, folks, they do not call it *marginal* VFR for nothing.) This belief was generally supported by official weather reporting documents.

What is also clear is that the word "forecast" is not fully understood. There is a huge difference between a report (what is actually happening) and a forecast (what might happen sometime). Weather forecasting is not, nor has it ever been, an exact science. A pilot who puts total faith in a weather forecast without using any reports or his or her own two eyes is really no better than the pilot with no faith at all. In either case it can mean encountering adverse weather en route that (famous last words) "wasn't supposed to be there."

We can diminish our weather ignorance somewhat. Plenty of good books have been written on aviation weather. Attend an Accident Prevention Program Seminar that features any of several excellent programs about weather. Commercial aviation organizations often conduct weekend seminars on the subject. Stupidity can be excused because it is an inability to know; ignorance is inexcusable because it involves *not wanting to know*.

Summing up what has been said, we can look at the following weather accident cause factors taken from an FAA study. Pilots involved in weather accidents:

1. were *ignorant* of the vagaries of weather
2. used poor judgement because of that ignorance
3. were deficient in flight training
4. were not aware of or disregarded their personal limitations
5. were negligent in maintaining flight proficiency
6. were unfamiliar with their aircraft capability
7. were unaware of or disregarded FAR's

The conclusion is left up to you.

*(This article courtesy of Al Milana, Accident Prevention Program Specialist in the Lincoln, FSDO.)*

# FINDING THE RIGHT WORDS

## Proper phraseology is the key to communication between pilot and controller

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*The commercial certificate applicant was on a VFR crosscountry flight and climbing through a Terminal Radar Service Area. She radioed approach control for Stage Three service, giving her aircraft type (Piper), N-number (N8529L), intentions, altitude, and heading. The approach controller gave the pilot a squawk and asked what kind of Piper.*

*"Approach, N8529 Lima is a Piper Warrior II, over."*

*"8529 Lima, I'll call you Cherokee 29 Lima, over."*

*"Roger, 29 Lima."*

*The same controller was also working a corporate Cessna Citation whose N-number was N3729 Lima. Approach control was calling this aircraft "Citation 29 Lima."*

*Ten o'clock in the morning, when the Cherokee was transitting the TRSA, was a fairly busy time for the major hub airport located there. The transmissions were frequent and numerous, but the Cherokee pilot was quite accustomed to busy terminal areas. She was almost clear of the TRSA when the controller radioed, "Cherokee 29 Lima, you are cleared to the Linden VOR and hold on the 090° radial. Break. United 256 climb to and maintain FL 180 . . ." and so on.*

*The Cherokee pilot immediately radioed back, questioning the clearance. Since she was VFR, the holding clearance did not seem appropriate. The controller acknowledged that the transmission had been for Citation 29 Lima instead. Now clear of the TRSA, the Cherokee pilot asked for termination of radar services to prevent further confusion. The Citation received the proper clearance, and everyone's flight ended smoothly.*

◆

In childhood some of the simplest party games were the most fun and, sometimes, the most embarrassing. One such game is Gossip or Telephone, where a whispered phrase is repeated from one person to the next until the last person recites it aloud. Most of the time the end results bear little resemblance to the original statement—making everyone wonder why the simple task of repeating a statement accurately is so difficult.

Pilot/controller misunderstandings can be likened to this game. Thousands of anonymous reports to NASA's Aviation Safety Reporting System are filed each year concerning conditions experienced or observed in flight which cited pilot/controller misunderstandings as responsible for potentially hazardous situations. How is this possible? Equipment failure? Pressure from heavy traffic flow? Interference? Linguistic problems?

All of the above, to some extent, but none predominantly. Most air traffic control facility managers will tell you that mistakes—on the rare occasion when they do happen—are more likely to result when either the pilot or controller *expects* or *anticipates* information. Typically the error occurs in a fairly relaxed situation and involves a very routine exchange of information. What happens is that the pilot, or the controller, or sometimes both, thinks he hears what he expects to hear and proceeds accordingly.

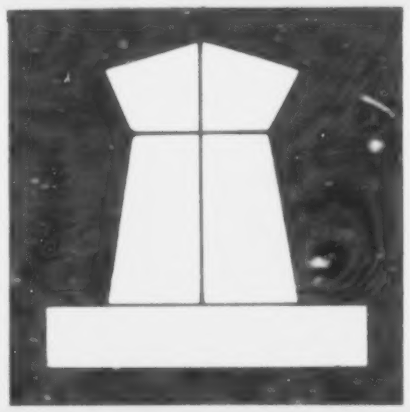
One way for the pilot to overcome this problem is to readback any clearance received to the controller. Although not foolproof, this practice helps to catch errors made by either party.

Another form of this "mis-anticipation" occurs when information a pilot is expecting does not arrive during the period expected, and the pilot changes course or altitude in a manner he assumes will be approved. Pilots should realize that as workload and weather conditions vary, controller techniques may also vary, but this is no reason for assuming the controller is neglecting your aircraft. A pilot should always be prepared to take action on his own when conditions concerning the safety of his aircraft require it, but second-guessing a controller—especially in IFR weather—is a dangerous game.

If you believe action on your own initiative is imperative, radio your intentions—the message may be heard even if it is not acknowledged. If

## PILOT/CONTROLLER GLOSSARY

The following excerpts from the Pilot/Controller Glossary in the *Air Traffic Controller's Handbook* are frequently used phrases in radio communications.



**ABORT**—To terminate a preplanned aircraft maneuver; e.g., an aborted takeoff.

**ACKNOWLEDGE**—Let me know that you have received and understand my message.

**ADVISE INTENTIONS**—Tell me what you plan to do.

**AFFIRMATIVE**—Yes.

**AIRCRAFT CLASSES**—For the purposes of wake turbulence separation minima, ATC classifies aircraft as Heavy, Large, and Small.

**ALTITUDE RESTRICTIONS ARE CANCELLED**—Adherence to previously imposed altitude restrictions is no longer required during a climb or descent.

**APPROACH SPEED**—The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration.

**BROADCAST**—Transmission of information for which an acknowledgement is not expected.

**CALL UP**—Initial voice contact between a facility and an aircraft, using the identification of the unit being called and the unit initiating the call.

**CARDINAL ALTITUDES OR FLIGHT LEVELS**—"Odd" or "Even" thousand foot altitudes or flight levels; e.g., 5,000, 6,000, FL 250, FL 260.

**CIRCLE TO RUNWAY (RUNWAY NUMBERED)**—Used by ATC to inform the pilot that he must circle to land because the runway in use is other than the runway aligned with the instrument approach procedure. When the direction of the circling maneuver in relation to the airport/runway is required, the controller will state the direction and specify a left or right downwind or base leg as appropriate.

**CIRCLING APPROACH**—Maneuver initiated by pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable. This maneuver is made only after ATC authorization has been obtained and the pilot has established required visual reference to the airport.

**CLEARED AS FILED**—Means the aircraft is cleared to proceed in accordance with the route of flight filed in the flight plan. This clearance does not include the altitude, SID, or SID Transition.

**CLEARED FOR (TYPE OF) APPROACH**—ATC authorization for an aircraft to execute a specific instrument approach procedure to an airport; e.g., "Cleared for ILS Runway Three Six approach."

**CLEARED FOR APPROACH**—ATC authorization for an aircraft to execute any standard or special instrument approach procedure for that airport. Normally, an aircraft will be cleared for a specific instrument approach procedure.

**CLEARED FOR TAKEOFF**—ATC authorization for an aircraft to depart. It is predicated on known traffic and known physical airport conditions.

**CLEARED FOR THE OPTION**—ATC authorization for an aircraft to make a touch-and-go, low approach, missed approach, stop and go, or full stop landing at the discretion of the pilot. It is normally used in training so that an instructor can evaluate a student's performance under changing situations.

**CLEARED THROUGH**—ATC authorization for an aircraft to make intermediate stops at specified airports without refiling a flight plan while en route to the clearance limit.

**CLEARED TO LAND**—ATC authorization for an aircraft to land. It is predicated on known traffic and known physical airport conditions.

**CORRECTION**—An error has been made in the transmission and the correct version follows.

**CROSS (FIX) AT (ALTITUDE)**—Used by ATC when a specific altitude restriction at a specified fix is required.

**CROSS (FIX) AT OR ABOVE (ALTITUDE)**—Used by ATC when an altitude restriction at a specified fix is required. It does not prohibit the aircraft from crossing the fix at a higher altitude than specified; however, the higher altitude may not be one that will violate a succeeding altitude restriction or altitude assignment.

**CROSS (FIX) AT OR BELOW (ALTITUDE)**—Used by ATC when a maximum crossing altitude at a specific fix is required. It does not prohibit the aircraft from crossing the fix at a lower altitude; however, it must be at or above the minimum IFR altitude.

**DIRECT**—Straight line flight between two navigational aids, fixes, points, or any combination thereof. When used by pilots in describing off-airway routes, points defining direct route segments become compulsory reporting points unless the aircraft is under radar contact.

**EXECUTE MISSED APPROACH**—Instructions issued to a pilot making an instrument approach which means continue inbound to the missed approach point and execute the missed approach procedure as described on the Instrument Approach Procedure Chart or as previously assigned by ATC. The pilot may climb immediately to the altitude specified in the missed approach procedure upon making a missed approach. No turns should be initiated prior to reaching the missed approach point. When conducting an ASR or PAR approach, execute the assigned missed approach procedure immediately upon receiving instructions to "execute missed approach."

**EXPECT (ALTITUDE) AT (TIME) OR (FIX)**—Used under certain conditions in a departure clearance to provide a pilot with an altitude to be used in the event of two-way communication failure.

**EXPECT DEPARTURE CLEARANCE (TIME) EDCT**—Used in the Fuel Advisory Departure (FAD) program. The time the operator can expect a gate release. Excluding long distance flights, an EDCT will always be assigned even though it may be the same as the Estimated Time of Departure (ETD). The EDCT is calculated by adding the ground delay factor.

**EXPECT FURTHER CLEARANCE (TIME)/EFC**—The time a pilot can expect to receive clearance beyond a clearance limit.

**EXPECT FURTHER CLEARANCE VIA (AIRWAYS, ROUTES OR FIXES)**—Used to inform a pilot of the routing he can expect if any part of the route beyond a short range clearance differs from that filed.

**EXPEDITE**—Used by ATC when prompt compliance is required to avoid the development of an imminent situation.

**FINAL**—Commonly used to mean that an aircraft is on the final approach course or is aligned with a landing area.

**FLIGHT LEVEL**—A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, an indication of 25,500 feet.

**FLY HEADING (DEGREES)**—Informs the pilot of the heading he should fly. The pilot may have to turn to, or continue on, a specific compass direction in order to comply with the instructions. The pilot is expected to turn in the shorter direction to the heading unless otherwise instructed by ATC.

**GO AHEAD**—Proceed with your message. Not to be used for any other purpose.

**GO AROUND**—Instructions for a pilot to abandon his or her approach to landing. Additional instructions may follow. Unless otherwise advised by ATC, a VFR aircraft or an aircraft conducting visual approach should overfly the runway while climbing to traffic pattern altitude and enter the traffic pattern via the crosswind leg. A pilot on an IFR flight plan making an instrument approach should execute the published missed approach procedure or proceed as instructed by ATC.

**HAVE NUMBERS**—Used by pilots to inform ATC that they have received runway, wind, and altimeter information only.

**HOW DO YOU HEAR ME?**—A question relating to the quality of transmission or to determine how well the transmission is being received.

**IDENT**—A request for a pilot to activate the aircraft transponder identification feature. This will help the controller to confirm an aircraft identity or to identify an aircraft.

**IMMEDIATELY**—Used by ATC when such action compliance is required to avoid an imminent situation.

**INCREASE SPEED TO (SPEED)**—Used by ATC to request pilots to adjust aircraft speed to a specific value for the purpose of providing desired spacing. Pilots are expected to maintain a speed of plus or minus 10 knots or 0.02 mach number of the specified speed.

**I SAY AGAIN**—The message will be repeated.

**LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY**—A safety alert issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgement, places the aircraft in unsafe proximity to terrain or obstructions. The controller may discontinue the issuance of further alerts if the pilot advises he is taking action to correct the situation or has the other aircraft in sight.

**MAINTAIN**—1) Concerning altitude/flight level, the term means to remain at the altitude/flight level specified. The phrase "climb and" or "descend and" normally precedes "maintain" and the altitude assignment; e.g., "descend and maintain 5,000." 2) Concerning other ATC instructions, the term is used in its literal sense; e.g., maintain VFR.

**MAKE SHORT APPROACH**—Used by ATC to inform a pilot to alter his traffic pattern so as to make a short final approach.

**MISSED APPROACH**—1) A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The route of flight and altitude are shown on instrument approach procedure charts. A pilot executing a missed approach prior to the Missed Approach Point (MAP) must continue along the final approach to the MAP. The pilot may climb immediately to the altitude specified in the missed approach procedure. 2) A term used by the pilot to inform ATC that he is executing the missed approach. 3) At locations where ATC radar service is provided, the pilot should conform to radar vectors when provided by ATC in lieu of the published missed approach procedure.

**NEGATIVE**—"No" or "permission not granted" or "that is not correct."

**NEGATIVE CONTACT**—Used by pilots to inform ATC that:

1) Previously issued traffic is not in sight. It may be followed by the pilot's request for the controller to provide assistance in avoiding the traffic.

2) They were unable to contact ATC on a particular frequency.

**NUMEROUS TARGETS VICINITY (LOCATION)**—A traffic advisory issued by ATC to advise pilots that the targets on the radar scope are too numerous to issue individually.

**ON COURSE**—1) Used to indicate that an aircraft is established on the route centerline. 2) Used by ATC to advise a pilot making a radar approach that the aircraft is lined up on the final approach course.

**OUT**—The conversation is ended and no response is expected.

**OVER**—My transmission is ended; I expect a response,

**PILOT'S DISCRETION**—When used in conjunction with altitude assignments, means that ATC has offered the pilot the option of starting climb or descent whenever he wishes and conducting the climb or descent at any rate he wishes. He may temporarily level off at any intermediate altitude. However, once he has vacated an altitude, he may not return to that altitude.

**RADAR CONTACT**—1) Used by ATC to inform an aircraft that it is identified on the radar display and radar flight following will be provided until radar identification is terminated. Radar service may also be provided within the limits of necessity and capability. When a pilot is informed of "radar contact," he automatically discontinues reporting over compulsory reporting points. 2) The term used to inform the controller that the aircraft is identified and approval is granted for the aircraft to enter the receiving controller's airspace.

**RADAR SERVICE TERMINATED**—Used by ATC to inform a pilot that he will no longer be provided any of the services that could be received while in radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases: 1) An aircraft cancels its IFR flight plan, except within a TCA, TRSA, ARSA, or where Stage II service is provided. 2) An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.

3) An arriving VFR aircraft, receiving radar service to a tower-controlled airport within a TCA, TRSA, or where Stage II service is provided, has landed; or to all other airports, is instructed to change to tower or advisory frequency.

4) An aircraft completes a radar approach.

**REPORT**—Used to instruct pilots to advise ATC of specified information; e.g., "Report passing Hamilton VOR."

**REQUEST FULL ROUTE CLEARANCE/FRC**—Used by pilot to request that the entire route of flight be read verbatim in an ATC clearance. Such request should be made to prelude receiving an ATC clearance based on the original filed flight plan when a filed IFR flight plan has been revised by the pilot, company, or operations prior to departure.

**RESUME OWN NAVIGATION**—Used by ATC to advise a pilot to resume his own navigational responsibility. It is issued after completion of a radar vector or when radar contact is lost while the aircraft is being radar vectored.

**ROGER**—I have received all of your last transmission. It should not be used to answer a question requiring a yes or no answer.

**RUNWAY HEADING**—The magnetic direction indicated by the runway number. When cleared to "fly/maintain runway heading," pilots are expected to comply with the ATC clearance by flying the heading indicated by the runway number without applying any drift correction; e.g., Runway 4, 040° magnetic heading; Runway 20, 200° magnetic heading.

**SAY AGAIN**—Used to request a repeat of the last transmission. Usually specifies transmission or portion thereof not understood or received.

**SAY ALTITUDE**—Used by ATC to ascertain an aircraft's specific altitude/flight level. When the aircraft is climbing or descending, the pilot should state the indicated altitude rounded to the nearest 100 feet.

**SAY HEADING**—Used by ATC to request an aircraft heading. The pilot should state the actual heading of the aircraft.

**SPEAK SLOWER**—Used in verbal communications as a request to reduce speech rate.

**SQUAWK (Mode, Code, Function)**—Activate specific modes/codes/functions on the aircraft transponder; e.g., "Squawk three/alpha, two one zero five, low."

**STAND BY**—Means the controller or pilot must pause for a few seconds, usually to attend to other duties of a higher priority. Also means to wait as in "stand by for clearance." If a delay is lengthy the caller should reestablish contact.

**STOP ALTITUDE SQUAWK**—Used by ATC to inform an aircraft to turn-off the automatic altitude reporting feature of its transponder. It is issued when the verbally reported altitude varies 300 feet or more from the automatic altitude report.

**STOP SQUAWK** (Mode or Code)—Used by ATC to tell the pilot to turn specified functions of the aircraft transponder off.

**TAXI INTO POSITION AND HOLD**—Used by ATC to inform a pilot to taxi onto the departure runway in takeoff position and hold. It is not authorization for takeoff. It is used when takeoff clearance cannot immediately be issued because of traffic or other reasons.

**THAT IS CORRECT**—The understanding you have is right.

**TRAFFIC IN SIGHT**—Used by pilots to inform a controller that previously issued traffic is in sight.

**TRAFFIC NO LONGER A FACTOR**—Indicates that the traffic described in a previously issued traffic advisory is no longer a factor.

**TRANSMITTING IN THE BLIND/BLIND TRANSMISSION**—A transmission from one station to other stations in circumstances where two-way communication cannot be established, but where it is believed that the called stations may be able to receive the transmission.

**UNABLE**—Indicates inability to comply with a specific instruction, request, or clearance.

**VERIFY**—Request confirmation of information; e.g., "verify assigned altitude."

**VERIFY SPECIFIC DIRECTION OF TAKEOFF (OR TURNS AFTER TAKEOFF)**—Used by ATC to ascertain an aircraft's direction of takeoff and/or direction of turn after takeoff. It is normally used for IFR departures from an airport not having a control tower. When direct communication with the pilot is not possible, the request and information may be relayed through an FSS, dispatcher, or by other means.

**WHEN ABLE**—When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able" should not be used when expeditious compliance is required.

**WILCO**—I have received your message, understand it, and will comply with it.

**WORDS TWICE**—1) As a request: "Communication is difficult. Please say every phrase twice." 2) As information: "Since communications are difficult, every phrase in this message will be spoken twice."

the frequency is blocked, use another—even 121.5 if the situation appears to be of an emergency nature.

One occasional cause of air-to-ground misunderstanding can easily be avoided: the use of non-standard phraseology, either by pilot or controller. Non-standard phraseology means anything from casual language to "CB" talk or slang. Slang is colorful and sometimes amusing but may be misleading. ("Neat," for example, in modern parlance can mean virtually anything but "tidy.") There is no room for guesswork in air traffic control phraseology.

Controllers are trained to use specific words and phrases which may sound stilted at times but which pinpoint their meaning precisely, and experienced pilots usually adhere to the same kind of language. Try to interject professionalism in your transmissions without being too stiff or formal, even if you are just out for a pleasure flight in a small single engine airplane. If someone, in a relaxed mood, falls into a slangy mode, there is no need for his respondent to go along with it. One small ambiguity can lead to a very large collision. In the example in the beginning of the article, even though it would have taken more transmission time, perhaps full N-numbers should have been used, or at the least, the Piper could have been called "*Warrior* 29 Lima" to help differentiate between the aircraft and eliminate confusion.

Once in a while pilots will encounter controllers who use local names that are not on the charts, instead of the usual reference points: "Turn final over Little Creek," might be an example. Which creek is Little Creek? And suppose there is no creek in sight, only a dry creek bed or two? Local pilots know, of course, but visitors are likely to wind up "up the creek" if they guess. The appropriate pilot response to any imprecise advisory is a straight-out question: "What do you mean?" (If you respond with "Say again, please," the controller will merely repeat the instruction without an explanation.) The point is, never "roger" anything that you do not fully understand or that does not make sense. Instead, request clarification.

Inexperienced pilots, or those who have never before flown into busy controlled terminals, are sometimes intimidated by and unable to keep up with the pace of ATC communications. In most cases the controller will recognize the problem and enunciate more slowly. In any event the pilot should never guess or try to anticipate what he cannot clearly understand. The controller is there to provide a helpful service, not to test the pilot's ability or question his competence. If the pace gets too much for a pilot, he can always ask the controller to speak more slowly. The *Airman's Information Manual* recommends that a low-time or student pilot let ATC know of their status, and ATC will adjust delivery accordingly.

Flying with a second pilot who can handle the radio, write down clearances, inspect charts, and scan for landmarks (as well as traffic) while you fly the airplane is one solution to getting safely over the hump of inexperience in a busy environment. If that is not possible, acquire the most convenient knee pad or other means of writing down radioed data. Controlling the aircraft, handling the radio, and going over charts and checklists can keep both your hands and your eyes pretty busy, and few of us have mastered the fine art of writing with a pencil in our mouth while talking on the radio.

Pilots who fly in busy terminal areas and often receive a great deal of information in a single transmission find out soon enough that memory alone is not sufficient when a string of numbers is involved. For example, IFR clearances should always be written down and at least the headings and altitude numbers readback. Similarly, taxiing instructions which involve several taxiways should also be written, and, as a minimum, any "hold short" instructions should be readback.

When messages are relayed very rapidly, there is a chance that numbers may be misspoken or misheard, especially when given in conjunction with similar sounding vowels. If you have any doubts, repeat the message, pausing briefly before enunciating each of the numbers. For example, a busy sector controller in a midwest air route traffic control center radioed a corporate jet climbing out at 1,800 feet to "climb to two two thousand." Hearing that sentence is much different from reading it: Did the controller mean climb to 2,000 feet or 22,000? The 34-year-old professional pilot queried for clarification after consultation with his copilot. The controller responded, "Roger, climb to two two thousand." The pilot persisted, asking if the controller meant altitude two thousand feet or flight level two two zero (22,000 feet). The controller then confirmed, "Climb to and maintain flight level two two zero."

The controller may sound busy and you may be a little uptight yourself, but neither of you can afford to make a mistake or rely on guesswork. The system works only when everyone is exactly where he is supposed to be and communication is complete.

It is a game for serious adults. ■

*(A full discussion of radio terminology is found in the Airman's Information Manual—Basic Flight Information and ATC Procedures, issued quarterly by the Superintendent of Documents, GPO, Washington, DC 20402. Contact GPO for the current price. Data concerning pilot and controller reports on unsafe conditions was derived from NASA's Aviation Safety Reporting System, a program where anyone can anonymously report to NASA incidents they witnessed or experienced that posed a threat to safe operations.)*

## TIPS FOR EFFECTIVE RADIO COMMUNICATIONS

- Listen before you transmit. Many times you can get the information you want from ATIS or by monitoring the frequency. Except for a few situations where some frequency overlap occurs, if you hear someone else talking, the keying of your transmitter will be futile and you will probably jam their receivers causing them to repeat their call. If you have just changed frequencies, pause, listen, make sure the frequency is clear.
- Think before keying your transmitter. Know what you want to say and if it is lengthy, for example, a flight plan or IFR position report, jot it down.
- Speak clearly, slowly, and audibly in a normal conversational tone to reduce the possibility of being misunderstood. The microphone should be very close to your lips and after pressing the mike button, a slight pause may be necessary to be sure the first word is transmitted. Some pilots find headsets handy because of the noise level in today's general aviation aircraft.
- Use the following format when making initial contact:

1) name of facility being called
2) your full aircraft identification
3) type of message to follow or your request if it is short
4) include your position or altitude, the phrase "Have numbers" or "Information Charlie received" (for ATIS) helps decrease radio frequency congestion. Use discretion and do not overload the controller with information he does not need.

- Wait a few seconds before calling again after you have released the button. The controller or FSS specialist may be jotting down your number, looking for your flight plan, transmitting on a different frequency, or selecting his transmitter to your frequency.
- Always use your aircraft identification in all transmissions.
- Acknowledge clearances, vectors, holding instructions, etc., with full readbacks and aircraft identification. This not only double checks for the pilot but also the controller the accuracy of the clearance and who received it.
- Check your volume, recheck your frequency and make sure that your microphone is not stuck in the transmit position. If the assigned frequency is completely blocked by this type of interference, use the procedures described for en route IFR radio frequency outage, to establish or reestablish communications with ATC.
- Be sure you are within the performance range of your radio equipment and ground station equipment. Remote radio sites do not always transmit and receive on all of a facility's available frequencies. Remember that higher altitude increases the range of VHF "line of sight" communications.
- Be considerate. Do not talk about personal business or gossip on ATC frequencies or the UNICOM. Others are waiting to talk to the same person so they can continue their flight. After landing you can telephone and get the information you want.
- Above all else, be professional in your transmissions whether you are the controller or the pilot.

# OPERATION LIGHTS ON

## Volunteer to be more visible

In recent years collision avoidance, both for aircraft in the air and on the ground, has become a priority item on the list of aviation safety concerns and rightfully so. When midair accidents occur they are usually very serious and often involve fatalities. Ground accidents are generally less serious but often involve substantial damage. (See the article on p. 3 for a discussion of ground collisions.)

Midair collisions occur on an average of two per month, and ground collisions between aircraft and between aircraft and ground vehicles average almost three per month.

Pilots can reduce the possibility of becoming involved in such accidents, in the air and on the ground, by:

- maintaining a constant scan for traffic
- avoiding complacency
- making position reports
- broadcasting your position and intentions at uncontrolled airports

Note: To prevent ground accidents, emphasize the first two points above in your daily operations. The latter two suggestions might unnecessarily tie up radio frequencies on the ground and should be used with discretion.)

Another safety measure a pilot can take is to participate in FAA's "Operation Lights On." This is a purely voluntary program in which all pilots are encouraged to turn on their anti-collision or other appropriate exterior lights when below 10,000 feet MSL and whenever (day or night) the aircraft engines are running. Also, turn on the landing lights when:

1. taxiing on to an active runway, day or night
2. operating within 10 miles of any airport, day or night
3. operating in conditions of reduced visibility; i.e., haze, dusk, etc.
4. operating where flocks of birds may be expected; i.e., in coastal areas, near lakes, swamps, dumps, or bird sanctuaries
5. operating under a Special VFR clearance

The purpose of all this is to make the aircraft as visible as possible. In reduced visibility conditions, some aircraft blend very well into surrounding haze or clouds or terrain. Pilots need all the help they can get in seeing and avoiding other aircraft on the ground and in the air, and "Operation Lights On" is a big help.

However, a few words of caution should be observed in relation to this practice.

- Do not become complacent about keeping a sharp lookout for other aircraft. Not all aircraft are equipped with lights and some pilots may not turn their lights on for various reasons. Continue to scan for other aircraft/vehicles even after a taxi or flight clearance has been received.
- Consult the aircraft manufacturer's recommendations on the operating limitations for the lights (especially the landing light) and the electrical load placed on the electrical system when all the lights are on. It is nice to enhance your visibility but not at the risk of an electrical failure in flight at the worst possible moment.
- Do not forget to turn the lights off before leaving your aircraft. No drain on the battery will occur with the master off, but the next time you go out to the aircraft and turn the switches on, the resulting electrical load could disable your electrical system.
- The *Airman's Information Manual* should be consulted for tips on operation of aircraft lights on the ground.

FAA is encouraging "Operation Lights On" as a further collision avoidance aid. Flight instructors are urged to participate during training flights and to get their students in the habit—but not at the expense of using the best collision avoidance device, the pilot's eyes.

Accidents can be prevented by paying special attention to safety. Your voluntary participation in "Operation Lights On" will help. ■

*(This article was prepared with the assistance of Ellen M. Bowie of FAA's Accident Prevention Program Branch.)*

# How to Buy a SAFE, Used Airplane

Buying an airplane is a relatively easy thing to do especially when you compare it to convincing your spouse that you have to sell the car so you can make the down payment on your dream.

But dreams can turn into nightmares for those individuals who buy with their hearts instead of their heads. To avoid a possibly hazardous situation, prevent a financial black eye, and fulfill your dreams, three steps should be taken in order to buy an airplane, which is, first of all, safe to fly.

**STEP 1—RESEARCH:** This is where the buyer justifies the "need" to own an airplane, matching one's pilot abilities to the aircraft's performance, and then matching one's cash flow to a particular make and model airplane.

Once the "need" is satisfied and a particular make and model has been selected, the buyer must find out as much information as possible about the airplane. Sometimes useful information is found in aviation trade publications (e.g., pilot test flights or evaluations), aircraft flight manuals, comments from owners of similar makes and models, and demonstration rides.

Other valuable pieces of information that are often overlooked by prospective buyers are the Type Certificate Data or Specification Sheets and Airworthiness Directives issued against the aircraft by the Federal Aviation Administration.

Type Certificate Data or Specification Sheets can be best described as "birth certificates" for aircraft, engines, and propellers. They describe the aircraft, engine, and propeller, list serial numbers, emergency equipment, limitations, and other important data.

Airworthiness Directives (AD's) are mandatory inspections, repairs, or replacement of parts against a particular aircraft or product. Some AD's are recurrent, others are one-time compliances. The two things notable about AD's are that they will cause airplane maintenance downtime and cost money. So the number of AD's against the airplane plus their impact on your pocketbook must be examined.

Type Certificate Data or Specification Sheets and AD's for the make and model you are interested in can usually be found at appropriately-rated FAA repair stations or aircraft dealer service centers doing business at local airports. At the same time it would be a good idea to pick up a manufacturer's inspection form, which contains a list of all items required for the 100-hour and annual inspections. These folks might charge a small fee for copies of the data, but the information received is worth many times the cost.

During this step is also the time to determine the operating cost of the aircraft per hour per year. Add up all the known expenses such as annual inspections, regular maintenance, tie-down, insurance, fuel, oil, engine, and propeller overhaul, and divide by the number of estimated hours per year the airplane will be operated. The fewer hours you operate the more expensive it is to own the airplane. If your expected usage will be limited, you might find it cheaper to rent or lease an airplane rather than own one.

Once you have assembled this mountain of information you must separate it into two columns—Pro and Con. Your head must not allow your heart to have any say here. The final count will determine if you proceed to Step #2.

**STEP 2—INSPECTION:** Now that the Pro's have won; inspection of the aircraft is next.

This part of buying an airplane usually consists of two or more inspections. The prospective buyer may perform several inspections on an airplane, but the last inspection should be done by a certificated mechanic familiar with the make and model airplane you intend to buy.

Obviously, to inspect an airplane you want to buy you must find one that is for sale. This is usually accomplished by scanning the "Aircraft for Sale" column of the local papers within a 50-mile radius of home (for your convenience) then checking any of several commercial publications to determine an average asking price. You should make appointments with the owners of at least three airplanes of the make and model you are interested in.

So, armed with the type certificate data or spec sheets, list of AD's manufacturer's inspection forms, flashlight, inspection mirror, clipboard, and pencil as well as a list of unanswered questions raised by your research, you arrive at the airport. Ideally, the airplane should be in a hangar with plenty of available light, but the first "Introductory" inspection can be done out on the ramp.

The purpose of this inspection is to make a preliminary determination if the airplane is "airworthy" or not. "Airworthy" is defined by the FAA as an airplane that meets all the requirements of its type certificate data or specification sheet and is in a condition for safe operation.

To make a determination that the airplane is airworthy you must start with what is basically a thorough preflight inspection. To begin, have the owner open all doors and the engine cowling, if possible, and have him show you the following documentation:

1. Airworthiness Certificate
2. Registration Certificate
3. Weight and Balance Form
4. Equipment List
5. Maintenance Records for the airframe, engine, and propellers.

Make sure that the make, model, serial number, and registration numbers are the same on all the certificate and maintenance records. Next make sure that the correct "N" number is on the airplane and the serial number on the airplane data plate is the same as the one on the certificates. Also check that the engine and propeller model and serial number on the data plates are the same as in the maintenance records.

All this number matching may seem a little bit childish, but it is very important! How else can you determine total time and maintenance history on the airplane unless the records reflect the actual equipment in the airplane. It is not uncommon to find an airplane with an illegitimate set of log books, instead of the originals.

Next, check the equipment list against the equipment in the airplane. If there are additional pieces of equipment in or on the airplane and the equipment list does not reflect them, you can be sure there is a good chance that the weight and balance is incorrect. If you find this is so, advise the owner that Federal Aviation Regulations require that the weight and balance and equipment lists be corrected by a certificated Airframe and Powerplant mechanic before the next flight.

The maintenance records are next. You should be able to trace the history of the airplane back to the day it was manufactured. During the records check is also a good time to see if the AD's against this particular airplane were compiled with. You should also copy down the date of the last annual inspection, total time of the airframe, engine, and propeller, and list the major repairs and alterations performed.

After the paperwork drill, you get the chance to use the "visual" in visual inspection. The manufacturer's checklist is your best guide for the inspection. Obviously you will not be able to do a gear swing or remove all the fairings on the aircraft at this time, but you should be able to mark off 35 to 50 percent of the items called out on the inspection form.

In addition to the manufacturer's inspection items, these following areas should be inspected:

1. The Artificial Horizon and Direction Gyro faces should be checked for milky white haze or fog on the glass. This is an indication that the instrument's glass seal has been breached and moisture has entered the instrument reducing the useful life of the gyros inside.

2. Move the fuel selectors through each position and check for ease of movement and detent, including the off position. A selector which is hard to move or makes a binding noise needs cleaning and lubrication.

3. Next, check for "Hangar Rash." Nicks, dents, and scrapes are the price an airplane pays for being wider than it is long. Most "Hangar Rash" occurs at the wing tips forward of the navigation lights. The majority of wing tips on general aviation aircraft are made out of fiberglas, and the tips can absorb a lot of punishment. However, if you notice the wing tip is damaged or even scraped you should carefully check the inboard rear spar area where the trailing edge of the wing attaches to the fuselage. If the wing skin in this area is buckled, creased, or in any way deformed, you can suspect that a great deal of damage has been done. How? The small impact or force at the wing tip has used the length of the wing as a lever to exert a tremendous force at the rear spar wing fitting. This could mean an unairworthy airplane and a very expensive repair.

4. Propellers are second only to landing gear in the amount of abuse pilots hand out. A propeller should be carefully inspected for cracks, nicks, corrosion, and alignment. The propeller tips will show signs that it struck the ground during a hard landing by grind marks visible on the ends of the propeller tips. If you find a propeller in this condition or see a log book entry that the propeller has been straightened, you should suspect a ground strike has occurred and that engine damage is possible.

5. During your inspection, you can determine if an airplane is within rigging tolerance by first setting the trim controls in neutral, flaps up, and removing all gust locks. Next, open the cabin door on the right side of the airplane so you can see the control yokes and then position yourself near the point on the right wing where the flap and aileron trailing edges almost meet. Now grab the aileron and flap and put the trailing edges side-by-side. This should be the neutral position. Next check the position of the control yokes in the cabin and the aileron and flap position on the opposite wing while keeping the right aileron and flap in the neutral position. The control yokes should be horizontal, and the flap and aileron on the opposite wing should be in the neutral position. If either of the control yokes or aileron is more than a ¼ inch away from neutral, the airplane is out of rig. The elevator/stabilizer and rudder are harder to check without the proper tools and rigging fixtures. However, you can determine if the cable tension is too loose by moving the elevator or rudder briskly, taking care not to hit the control stops and listening if the cables slap the cable guides. This slapping or whipping sound is a good indication the cable tension is too loose and the flight controls are out of rig.

If, after the visual inspection, you are satisfied that the airplane is airworthy, a test flight should be next. If you are not familiar with the aircraft make sure your check pilot is. The test flight or demonstration ride should determine if the airplane meets the flight manual/owner's manual performance specifications and that all equipment works properly. You might need to make several flights to satisfy yourself that the airplane performs to your and the manufacturer's standards.

**The Final Step—Decision!** After you have inspected at least three aircraft and narrowed your choice down to one, you need the help of an experienced mechanic and a title search company.

The mechanic should be chosen with care. He or she should be familiar with the make and model of the airplane you are interested in and have all the equipment and data necessary to inspect and research the gray areas you might have overlooked. The inspection should determine the mechanical condition of the airplane, its related parts, and the airworthiness condition of the aircraft. The annual-type inspection is the very best inspection to make this airworthiness determination.

At the same time a title search must be started. A title search is very important for it will certify that the title for the airplane is free and clear or if there is a lien against the airplane. For an additional charge you can obtain title insurance by which the title company guarantees your title against unrecorded liens, chattel mortgages, and other claims against the airplane. A list of title companies can be obtained from the nearest FAA Flight Standards District Office (FSDO).

While you are at the local district office you can also pick up an application for registration (AC Form 8050-1) and Bill of Sale Form (AC Form 8050-2), since federal regulations require new owners to register their aircraft with the Federal Aviation Administration Registry in Oklahoma City. The cost of registering the airplane is still only $5.00.

Now the only thing left to do is to make the decision to buy or pass this opportunity up. If your research has been thorough, both your and the mechanic's inspections satisfactory, the title is free and clear, and you convinced your spouse to sell the car, go buy your dream. ■

*(This article was prepared with the assistance of Bill O'Brien, a specialist in the General Aviation and Commercial Branch of the Aircraft Maintenance Division.)*

# AvNEWS

U.S. AEROBATIC CHAMPS. Just before departing for South Cerney, Gloucestershire, England for the 13th World Aerobatic Championships, the 1986 U.S. team (pilots, team doctors, judges, et. al.) posed for a group portrait with their aircraft. Front l. to r.: Bill Thomas, Bob Tiberg, Ray Williams, Dr. Eoin Harvey, Paul Erdman, Terry Caphart, Bill McIntyre, Bill Hunter, and Bob Davis. Standing l. to r.: Pete Anderson, Clint McHenry, Debby Rihn, Dr. Julie Pfile, Harold Chappell, Henry Haigh, Kermit Weeks, Linda Meyers, Patty Wagstaff, Gene Beggs, and Bob Carmichael.

## SUCCESSFUL SAFETY SEMINARS

"Back-to-Basics" is packing them in. FAA's three year project to re-emphasize the fundamentals of flying is enjoying spectacular success and airman participation. Since the start of Back-to-Basics in January of this year, there have been 6,400 seminars nationwide, attended by 300,000 persons.

A recent example of this success occurred in Hartford, CT at Bradley International Airport. An Accident Prevention Program "Super Seminar" with the theme "Safety Through Education and Proficiency" (STEP) held on June 21 attracted nearly 3,000 pilots. Over 200 airplanes flew into Bradley Field to attend the event, but pilots and controllers responded with safe and professional operations.

Attendees were treated to an address given by FAA Administrator Donald D. Engen and presentations from other local and national FAA personnel. Connecticut's governor and a Congresswoman were also featured speakers. Notables from the aviation industry were also well-received. Perhaps the highlight of the program were the personal reminiscences of actress Pamela (*Buck Rogers, Matt Houston*) Hensley and actor Cliff (*The Pilot*) Robertson. Ms. Hensley is a recently certificated private pilot, and Mr. Robertson, a high-time pilot, has appeared at safety seminars all over the country. Although a difference of many hours of experience separate them, the two entertainers were in unison about the need for Back-to-Basics.

The Back-to-Basics topic for the final quarter of 1986 is Fueling Problems—or to put it in Back-to-Basics simplicity, "running out of gas." Continued high seminar attendance is expected for 1987, and the topics for the first two quarters of 1987 are "Decision Making" and "Medical Factors," respectively.

Contact your local accident prevention specialist for seminars in your area.

See you there!

## GIVING CUSTOMS A HAND

In response to a request from the U.S. Customs Service, FAA has proposed three rule changes to aid Customs in stopping drug smuggling by aircraft.

One rule would require the display of registration marks (N-numbers) 12-inches high on aircraft flying in and out of the U.S. Larger marks make it easier to spot and identify aircraft from the ground.

The second proposal would require aircraft to have an externally-mounted identification plate readable by persons standing outside the aircraft while it is on the ground. The outside ID plate would allow law enforcement officials to check suspicious aircraft more easily.

The last proposal would require operators of aircraft modified with supplemental fuel tanks (under FAR Part 43) in the passenger or baggage compartment to have on-board documentation (FAA Form 337) that the tanks' installation was FAA-approved.

## ATA PETITION COMMENTS SOUGHT

FAA is accepting comments on a petition for rulemaking from the Air Transport Association of America. ATA wants various sections of FAR Part 91 amended to require additional implementation of automatic altitude reporting equipment in aircraft currently not required to have it and improved equipment in aircraft now having automatic altitude reporting equipment.

The petition consists of five proposals:

1. carriage of an operating transponder with automatic altitude reporting capability in all terminal airspace where radar service is provided and in all controlled airspace above 4,000 feet AGL, effective July 1, 1989
2. effective July 1, 1992 require all new altitude reporting equipment installations to meet improved performance standards and to reply to Mode S interrogations with altitude information in 25-foot increments
3. effective July 1, 1997 require all operating transponders to meet the standards in proposal #2
4. revise FAR Part 43, Appendix E to incorporate the proposed standards and reduce the increments for inspections and maintenance
5. require biennial checks of automatic altitude reporting equipment in all aircraft so equipped, not just for IFR aircraft

Comments should be sent as soon as possible to FAA, Office of the Chief Counsel, AGC-204, Docket No. 24953, 800 Independence Ave., S.W., Washington, D.C. 20591.

## LATEST AIRMAN PUBLICATIONS

### New Written Test Books

Copies of the new written test question books, which may be used for study purposes by applicants for the various pilot, flight engineer, and mechanic certificates issued by FAA, are now on sale at the Government Printing Office. Titles, prices, and identification data are provided in FAA Advisory Circular 60-19, "Announcement of Availability: New Series Written Test Question Book." Free from DOT Subsequent Distribution Unit, M-494.3, Washington, D.C. 20590.

## VOYAGER UPDATE

On July 15 *Voyager* landed in the Mohave desert after a four and a half day flight which broke several aviation records (longest flight without refueling and longest non-stop flight). The flight was a trial run for the proposed, non-stop, around the world trip scheduled for September 11, 1986.

Pilots Dick Rutan and Jeana Yeager stayed aloft for 11 hours and 11,600 miles without stopping or refueling. They travelled up and down the California Coast, averaging 90 mph and 29 miles to the gallon.

# FlightFORUM

## • Clearing Turns

*I am a commercial student, and my instructor and I need your help in clarifying something. We say that clearing turns must be done before executing chandelles and "Lazy 8's." Another instructor says they are clearing maneuvers in themselves, and no turns are necessary. Who is correct?*

*Also, in airplanes with controllable speed propellers, I know some pilots who climb to cruise altitude with the throttle and prop levers full forward, developing full power. Others reduce the manifold pressure and RPM to "25-square" during initial climb-out. Which is correct?*

*Name Withheld*

For your first question, you and your instructor are correct. An applicant for any pilot certificate or rating must use proper and effective scanning techniques to "clear the area" for certain maneuvers, including chandelles and "Lazy 8's." The inclusion of clearing turns is part of FAA's new Practical Test Standards. Also, the *Flight Training Handbook*, AC 61-21A, advises that, for both chandelles and "Lazy 8's," ". . . the airspace behind and above should be clear of other air traffic." Since both of these maneuvers involve, at some point, nose-high attitude and steep banks which can obscure the pilot's visual field, the clearing turns are necessary.

As for your second question, all we can say is check the pilot's operating handbook for the aircraft and follow the manufacturer's recommendations.

## • Controller ID'ed

*The article on the 50th anniversary was very interesting. I particularly liked the comments on Archie League. Is that he with the flag in the title picture?*

*Heather Schoenberg*
*Cheyenne, WY*

Affirmative. That certainly is Archie in all his regalia.

## • Changing of the Guard

*I have noticed in the last several issues you have had the Accident Prevention Program on your masthead and that more accident prevention-type articles have been appearing on topics that match those for Back-to-Basics. I think it's great, but what does it mean?*

*Jenni Verge*
*Clinton, MD*

It means that *FAA General Aviation News* is now a part of the Accident Prevention Program Branch. We are enjoying it, and we are glad you like it, too.

## • Unauthorized Takeover

*I'd like to pass on some advice learned the hard way to those of you who can't wait to get your tiny tots in the copilot's seat. My toddler (two years old) had been begging for an airplane ride. So I moved the passenger seat on my C-172 fully aft and strapped in the FAA-approved car seat. During takeoff, as the airplane neared flying speed, I eased back on the yoke. When my son saw the yoke on his side moving toward him, he lunged forward, grabbed the yoke with both hands, and pulled with all his not insubstantial might. I managed to keep out of a stall and finally pried his fingers off in cruise. However, he discovered even though I might smack his hands, he could still kick the yoke with his feet.*

*He also tried to fight me for the handheld mike while I was talking to approach control—they must have heard some pretty strange transmissions. Blessedly, after 20 minutes aloft he fell asleep, and I learned my lesson. A good backseat passenger, which he was, can't always be trusted within grabbing distance of the controls—especially when they're in the "terrible two's."*

*Name withheld*

**FAA GENERAL AVIATION NEWS** welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.

How right you are! Aviator parents naturally wish to introduce their offspring to flying as soon as possible. As you have indicated, they can be quite a distraction, so a little discretion is in order.

# INSTRUMENT CORNER

## • Competency Check and BFR's

*I'm writing in reference to FAR § 61.57 (Recent Flight Experience). I'm an instrument rated commercial pilot, and I've been meeting the recent IFR experience requirement by getting a competency check every six months. My question is does this IFR check count as a biennial flight review? If so, how is it noted in my logbook? If not, what do I have to do in addition to the IFR competency check?*

*It appears to me that if there is any way to combine the review and the competency check, I'd be better off legally, professionally, and financially.*

*Sidney Fleishman*
*Panama City, FL*

The instrument competency check will satisfy the requirements for a biennial flight review. A flight review is not necessary if, within the preceding 24 months, you have had a pilot proficiency check (by the FAA, by an approved check airman, or by a U.S. armed forces pilot) for a pilot certificate, rating, or operating privilege. The instructor conducting the review notes successful or unsuccessful completion by an appropriate notation in your logbook. However, the decision to count the competency check as a BFR also is up to the flight instructor.

## • Logging Instrument Time

*I recently went back through my back issues of FAA* General Aviation News *to try to find an answer to a question I have regarding logging of instrument time. I was unable to find quite what I was looking for, so I am writing for a specific answer.*

*The situation is this: Pilot A is instrument rated and current. Pilot B is not instrument rated (but wants to practice for the rating). Both pilots are current for the category and class of aircraft, with current medicals and BFR's. Both hold private pilot licenses (only, no CFI for Pilot A). According to the FAR's, when Pilot B is in VFR conditions with a hood and on an IFR flight plan, with Pilot A in the right seat as check pilot, Pilot B may log this time as PIC and Pilot A may (only) log this time as "check pilot" or "second in command." (Right?)*

*My question is this: In the same situation, but in ACTUAL IFR conditions, who logs what? Can Pilot B still log PIC even though not rated for IMC? Or is Pilot A now the "official" PIC? Does the situation change if Pilot A is a CFI? (I would guess so since all "dual" time after the private license is also PIC.)*

*I have been unable to find a clear answer to this in the FAA publications (FAR's, AIM, etc.) and from various CFI's. Since the word of this magazine is just as good, I would really appreciate knowing how this is supposed to be done and who can log what? Many thanks!*

*P.S. One further question: Does any of this type of flying count toward the required time for Pilot B's instrument rating?*

*Claudia Kelly*
*Simi Valley, CA*

In answer to the first "situation" cited as we understand the conditions stated:

Pilot B *may* log the time during which he or she manipulates the controls of the aircraft flown as pilot-in-command in accordance with FAR § 61.51 (c)(2)(i).

Since Pilot B is not instrument rated, Pilot A *must be* pilot-in-command as defined under FAR § 1.1 (which identifies the pilot responsible for the operation and safety of an aircraft during flight time). It should be understood that although Pilot A is serving as "safety pilot" under FAR § 91.21(b), he or she must still be pilot-in-command under FAR § 1.1 and may log the time while serving as pilot-in-command in accordance with FAR § 61.51 (c)(2)(i).

In the second situation, the above circumstances are changed only by the flight conditions being changes to *actual* instrument meteorological conditions (IMC).

Pilot B may still log the time during which he or she manipulates the controls as pilot-in-command in accordance with FAR § 61.51 (c)(2)(i).

Pilot A *must* be pilot-in-command as defined in FAR § 1.1 and may, thus, log the time serving as pilot-in-command in accordance with FAR § 61.51 (c)(2)(i).

If Pilot "A" were to become a certificated flight instructor, he or she *must still be* pilot-in-command under FAR §1.1 and would then be serving a dual role as both *safety pilot* and *flight instructor* and may log the time as pilot-in-command under either FAR § 61.51 (c)(2)(i) or § 61.51 (c)(2)(iii) as he or she chooses.

The flight experience gained under the above conditions is creditable toward an instrument rating and should be logged in accordance with the specific guidelines of FAR § 61.51 (a), (b), and (c), (2), (4), and (5).

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Cont. from page 4

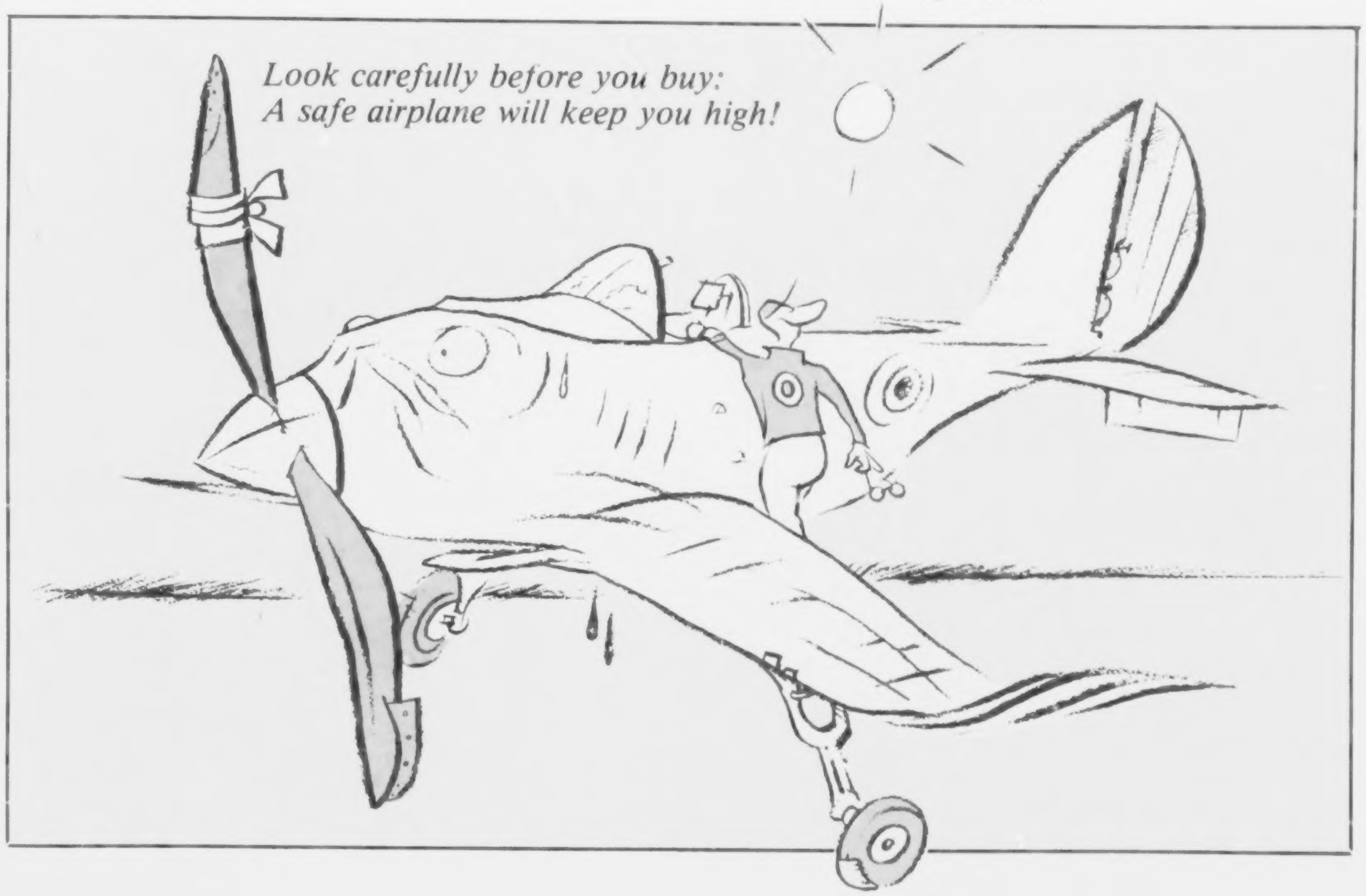
Until an aircraft or ground vehicle at the hold line is cleared by the tower to cross the hold line, the lights will remain red. When the tower gives an aircraft clearance to proceed beyond the hold lines, controllers will switch the hold line lights from red to green. This new combination of visual and oral communications could help decrease pilot/ATC mis-communication. (See p. 7 for an article on proper phraseology in pilot-controller communications.) Similar systems have been used in Europe for quite some time and seem to work well, and they have become an International Civil Aviation Organization standard. They may soon become a familiar sight at U.S. airports.

The bottom line in most of the accidents surveyed seems to be pilot complacency or inattention. Controllers, of course, are not blameless in this sort of problem. Any time you receive a taxi clearance or instruction which seems questionable, your PIC responsibilities allow you to disregard it in the interest of safety, after informing ATC of your intentions. The best ground (and midair) collision avoidance system is still you, the pilot.

However, by considering and following a few simple rules, you can increase your own operational safety on an airport. Always be aware of where you are on an airport and know the location of other airport traffic. Keep alert anytime you move your aircraft—not just during taxiing but also when moving it by a push bar or a motorized tug. Know the markings, signs, and lighting systems used on airports. Listen carefully to ATC instructions. If they are unclear, ask the controller to explain them. Remember, it is probably *you* who can best prevent close encounters of the ground kind.

See and avoid means on the ground, too. ■

*(This article was prepared with the assistance of Leslie K. "Spike" Vipond, a Specialist in the Accident Prevention Program Branch.)*


Look carefully before you buy:
A safe airplane will keep you high!